FOUNDRY

SEPTEMBER
1 9 5 5

A PENTON PUBLICATION

The New
Chevrolet Tonawanda Foundry
page 112

CONTENTS—page 3

COLLECTING FUMES
Has Advantages—p. 152

CONTINUOUS MELTING
In New Type Furnace—p. 143

AUTOMATED SAND SYSTEM
Raises Production—p. 158

TR v.83 S-I '55

Q• What **ADDS** to gray iron **QUALITY** yet **SAVES** on casting **COST**?

A• FERROCARBO® by CARBORUNDUM

REGISTERED TRADE MARK

THROWN INTO THE CHARGE, FERROCARBO® in patented briquette form, lets you give your customers gray iron castings that are finer-grained, denser, stronger... with fewer chilled spots and segregations. Machining tests in 11 leading shops prove that castings of gray iron treated with FERROCARBO® averaged 89.5% greater machinability per tool than untreated castings. And deoxidizing with FERROCARBO® generally permits use of cheaper melting materials in the charge... so *you* make worthwhile savings, while giving your customers *premium* castings.

OVER 600 LEADING FOUNDRIES are now using FERROCARBO® to produce superior castings—both gray iron and malleable. Are *you* among them?

GET THIS FREE BOOKLET! Gives benefits, results, instructions for use of FERROCARBO®. Write The Carborundum Company, Dept. F 84-511, Niagara Falls, N. Y.

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Tech

When you plan an electric furnace...

COMPARE COSTS PER TON OUTPUT

In these highly competitive times, we must be penny-wise *and* pound-for-pound-wise in figuring the costs of an electric furnace. Cost per ton of output is the wise way! So compute your costs by considering *all* factors! Here is why the Whiting Hydro-Arc Electric Furnace costs less *per ton of melt!*

(I) INSTALLED COST IS LESS because:

(1) the Whiting furnace foundation is simple
(2) it is completely assembled before shipment and shipped as fully assembled as practical
(3) cables are completely assembled
(4) all in-board wiring is finished and terminated at coded terminal blocks.

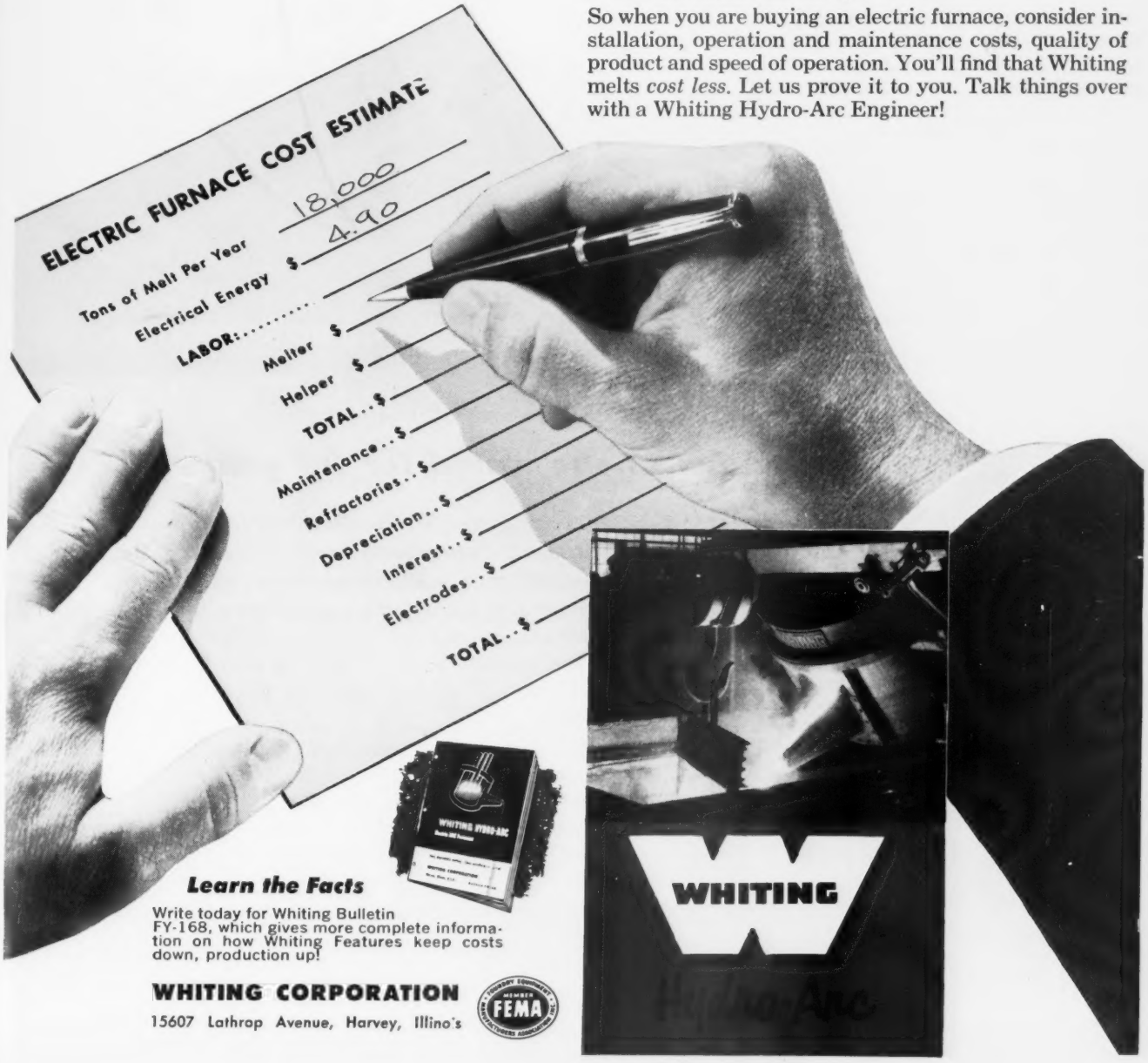
(II) OPERATING COST IS LESS because:

(5) electrode consumption is less
(6) electrode breakage is practically non-existent
(7) electrical energy usage for comparable operations is low
(8) top-charge, electrodes, furnace tilt and electrode clamps all operate quickly and efficiently
(9) transformer is designed to do the best job
(10) faster heats, more tons per hour

(III) MAINTENANCE COST IS LESS because:

(11) fewer working parts
(12) conveniently arranged working parts
(13) roofs are interchanged in 15 to 30 minutes
(14) refractory costs are at least 15 per cent less
(15) top-charge always in alignment
(16) all parts exposed to excessive heat are amply water-cooled
(17) smooth hydraulic operation of electrodes, furnace tilt, roof lift, and swing

So when you are buying an electric furnace, consider installation, operation and maintenance costs, quality of product and speed of operation. You'll find that Whiting melts *cost less.* Let us prove it to you. Talk things over with a Whiting Hydro-Arc Engineer!



Learn the Facts

Write today for Whiting Bulletin FY-168, which gives more complete information on how Whiting Features keep costs down, production up!

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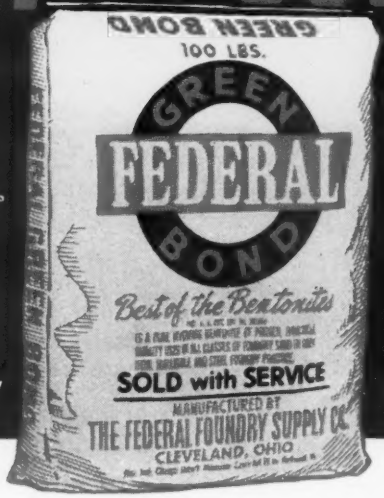

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the standard of the world for 30 years

Bentonite was first developed in 1925, by FEDERAL, as an admix to molding and core sands. FEDERAL GREEN BOND was introduced at that time as a *pure* bentonite of the highest quality, specially processed for foundry use. It's been just that ever since—unadulterated, untreated, free of chemicals or other ingredients detrimental to foundry sands or operating conditions.

FEDERAL GREEN BOND is supplied in *three* convenient forms: (1) PULVERIZED—for general foundry use as a dry additive for core and molding sand; (2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core and molding sand; (3) No. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

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FOUNDRY
A PENTON PUBLICATION

September 1955
Volume 83—Number 9

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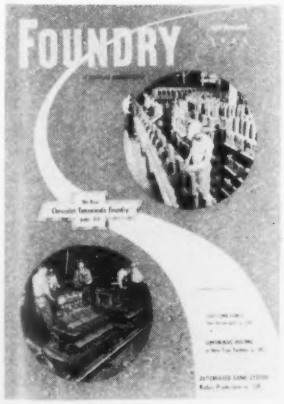

THE COVER: Two scenes from the production lines of the new foundry, Chevrolet Motor Division, General Motors Corp., Tonawanda, N. Y. See p. 112

SPECIAL ARTICLES

Editorial 111

Chevrolet's Tonawanda Foundry 112
Coremaking 114
Molding 121
Melting 126
Cleaning 131
Patternmaking 135
Miscellaneous 138
Equipment Suppliers 141

Aluminum Continuous Melting Furnace 143
Continuous melting and automatic pouring of aluminum castings improves control, cuts overhead and raises quality—By JACK C. MISKE

General Electric Research Laboratory 148
Metals and ceramics laboratory uses many melting techniques in research and development projects—By A. J. KIESLER and R. E. CECH

Furnace Fume Collection 152
Installation of fume collector not only solves air pollution problems but provides other indirect benefits—By EUGENE F. ANDERSON

The Brass Foundry 154
Second in series emphasizes that careful selection and preparation of metal before melting will help increase yield—By HARRY ST. JOHN

Automated Sand System 158
Production and quality are raised by automatic sand formulation, processing, handling and distribution system—By I. H. RICHARDSON

Aluminum Foundry Mechanizes Sand System By J. L. LIVINGSTON 178

The Sand-Cast Matchplate By H. F. DIETRICH 182

New England Regional Conference Program 185

Man-to-Man By RALPH L. LEE 190

Plastic Core Driers By DON W. SCHMANSKI 199

Trouble Shooting By C. W. AMMEN 210

International Foundry Congress Technical Reports 220

Saving Floor Space and Manpower By WILLIAM D. DUNN 266

Meditations of a Sandman By HAROLD E. HENDERSON 272

NEWS FEATURES

Around the Country	204	Industry Briefs	253
Calendar of Meetings	14	Late Foundry News	33
Foundry Group Activities	246	Men of Industry	166
Obituary	248		

REGULAR DEPARTMENTS

Classified Advertising	333	Questions and Answers	162
Data Sheet	263	Readers' Comment	106
Foundry Developments	260	The Shakeout	318
How To Do It	300	Statistics	243
Ideas for Foundrymen	281	Trade Publications	311
New Equipment and Supplies	278	With the Editors	10

Business Staff—page 343 Advertisers' Index—page 343

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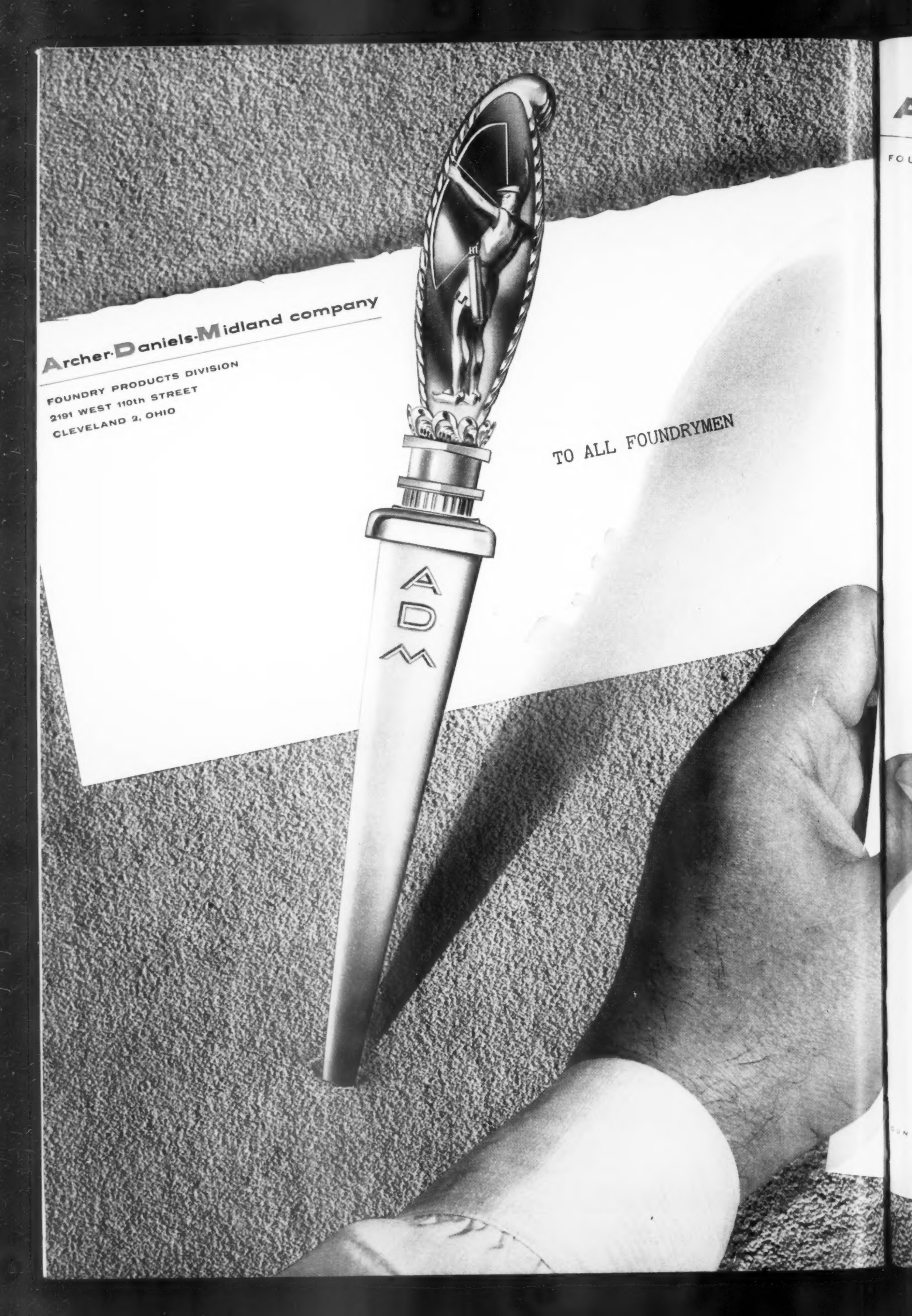
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OPEN LETTER TO ALL FOUNDRYMEN:

The next step to making better, more uniform, lower-cost cores is <u>yours</u>. ADM can help you. Here's how:

1) ADM makes all types of binders: urea and phenol synthetic resins, alkyds, D process and C process binders, numerous specific-purpose LINOILS and several fast-baking INDUCTOLS. Therefore, we can impartially prescribe the type that is right for your specific application.

2) ADM core binders can often cut your core oil costs 10c to 40c per gallon due to our completely integrated production.

3) With 26 ADM warehouses and manufacturing facilities in 6 locations, you get overnight delivery anywhere in the country.

4) ADM's field organization (the largest in the business) is always at your service.

If you want to make a good casting better...if you are especially concerned about quality or uniformity of cores, see your ADM LINOIL man. Call him today.

Sincerely,

ARCHER-DANIELS-MIDLAND COMPANY
Foundry Products Division

L. P. Robinson
Vice President

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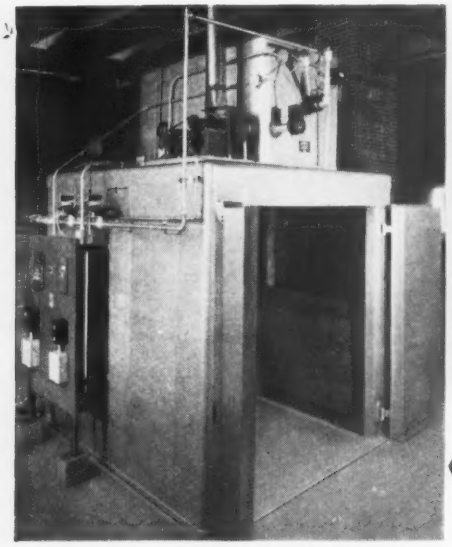
IS THE HEAVY HAND of OBSOLESCENCE

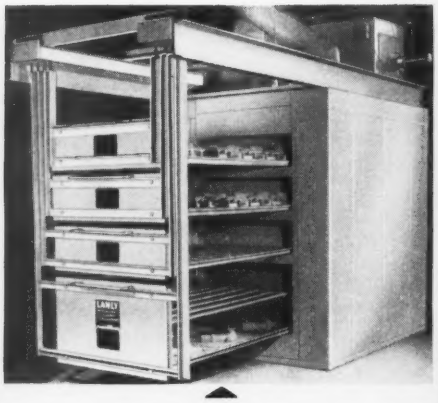
Retarding Your Production

OLD STYLE, INEFFICIENT CORE OVENS

with antiquated hand firing and charging methods can add appreciably to your operating costs.

Then too, there is the problem of a high percentage of rejects in old oven production. Can you afford this?





1. Drawer Type Oven

2. Single Compartment Rack Type Oven

3. Car Type Oven

Isn't this an opportune time to examine closely the oven facilities of your foundry for a possible improvement? The average foundry requirements can be met with standard LANLY units. Custom designed units for core baking, pasting and mold drying are part of LANLY'S services, as well as ovens for casting conditioning and heat treating.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

LANLY FOUNDRY OVENS

THE LANLY COMPANY • 780 PROSPECT AVE
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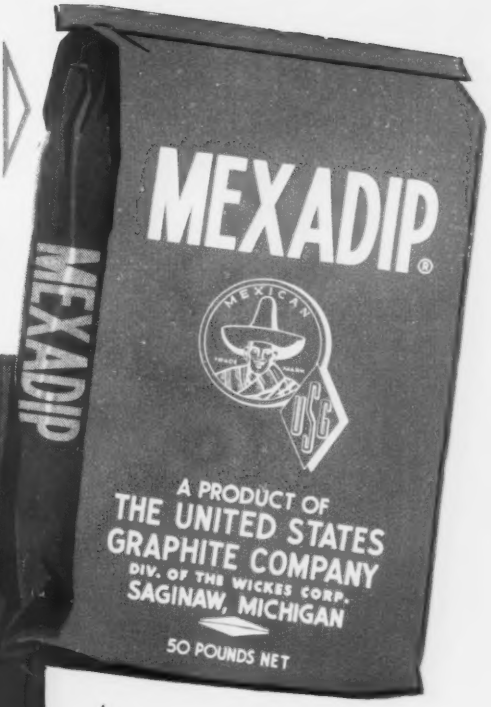
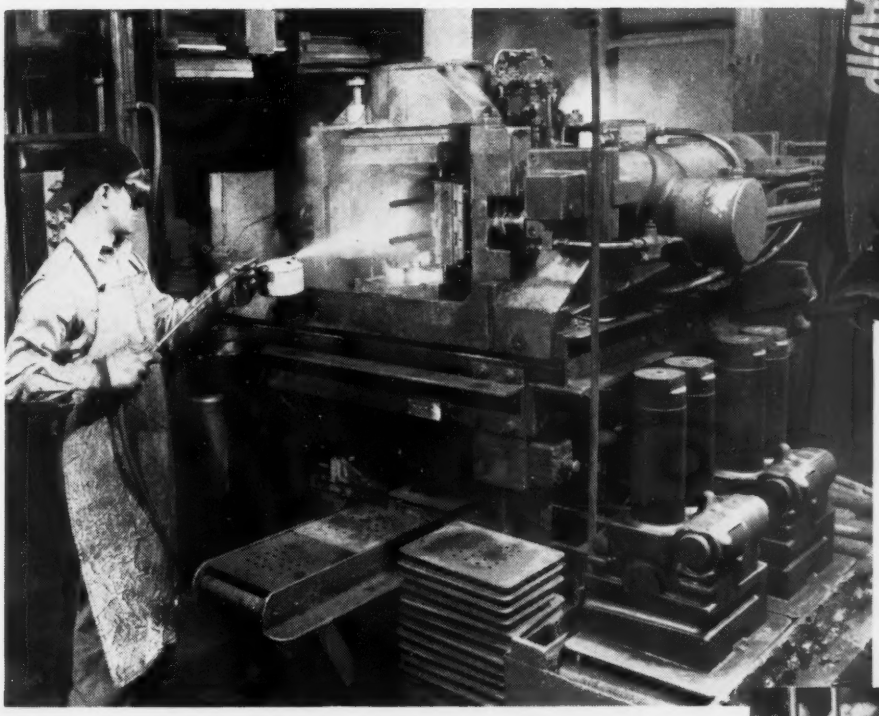
the core coating doing the job at America's newest automotive foundry





Barrel cores awaiting transfer to conveyor racks for baking oven after being coated with Mexadip.

Spraying cylinder jacket cores with Mexadip after cleaning.

208

Getting barrel cores and cylinder jacket cores to the pouring line on time and in perfect condition is vitally important in automotive engine production. In the newest of these foundries, MEXADIP is doing its part . . . doing the best core coating job and helping to keep the lines running on schedule.

MEXADIP has done the job consistently for years in some of America's largest foundries. It's a refractory core coating that has all the "built in" requirements the modern foundryman demands. Requires only water to prepare • does not ferment • contains its own binder • used for green or baked cores . . . in fact, if your cores are large or small, for ferrous or non-ferrous casting, large production or batch jobs, MEXADIP is the one core coating you can depend upon for all your production.

OUR 101ST YEAR

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

CUT CORE-MAKING 6 COSTS WAYS by the CO_2 Process

using STEINEX BINDER *and* HANSBERG CORESHOOTERS

1. ARE LARGE CORES A PRODUCTION BOTTLE-NECK IN YOUR OVENS? *You can now cut costs by hardening these cores in a few seconds by this CO_2 process.*
2. Eliminates drying ovens and their maintenance. Saves fuel and labor costs. GREATLY SPEEDS CORE-MAKING.
3. No waiting, no storage of cores necessary — cores hardened in the core box can be used immediately. Save a whole day's time on rush orders.
4. Nails, gaggers and wires are practically eliminated since core hardens right in corebox.
5. Because of the greatly improved accuracy with this method, casting tolerances may be held to a few thousandths of an inch.
6. Facing very large molds with Steinex Sand eliminates necessity of oven drying.

HANSBERG CORESHOOTER

Here is an entirely new type of core-making and shell-molding machine. It incorporates a new fundamental principle referred to as the "SHOOT." Uses very little compressed air. Economical for mass production and SHORT RUNS AS WELL. Incredibly fast production time is assured.

STEINEX BINDER

STEINEX is a remarkable core sand binder. Cores and shell molds, made of core sand mixed with STEINEX, can be hardened in a few seconds by the injection of carbon dioxide.

These cores and molds may be cast IMMEDIATELY.

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Manufactured by

FOUNDRY PRODUCTS CO.

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. . . AND GET *More* PERFECT CASTINGS

DELTA Z-KOAT and ZZ-KOAT Washes are easy to mix and easier to apply. After mixing, there is no danger of precipitation and, when dried, they are completely moisture-proof. Applied by swabbing, dipping or brushing, they adhere uniformly to the sand and produce smooth, highly-refractory surfaces.

Both DELTA Z-KOAT and ZZ-KOAT Washes have unusually high fusion points and, because of their high heat conductivity, provide a more rapid surface-metal set. Both washes are economical to use.

DELTA Z-KOAT contains zirconium plus other high fusion refractories and DELTA ZZ-KOAT is an all-zirconium type wash.

DELTA

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

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FIRST in stitched canvas belting for over 45 years

With the EDITORS

PENTON'S FOUNDRY LIST: Back about the beginning of the century, FOUNDRY undertook the preparation of a list of foundries in the United States and Canada. It was published as *Penton's Foundry List*. Since that time, with the exception of a short period during the thirties, a new PFL directory has been published every other year, and has been found exceptionally useful to foundrymen, their suppliers and government. In fact, during the war, it was the main source of information on location of casting capacity for government procurement agencies.

After months devoted to planning, collecting information and organizing the material, the 1955-56 *Penton's Foundry List* came from the printer the first week in August. After watching the operation and seeing the result, I am sure that this is perhaps the best PFL yet published. It betters previous volumes from the standpoint of completeness, accuracy and good arrangement of data.

Special credit for this fine directory should go to David Gibbs, manager of market research and promotion, and to Mildred Christopher and Helen Smith of that department. It may be purchased through Elsie Ihlenfeld, FOUNDRY Book Department.

—o—

No Objection: On several occasions I have commented on the need for trade association representation on the industry advisory committees appointed by government, especially in preparing for operating in national emergencies. Associations have detailed statistics of the industry, they know its abilities, its problems and its needs. No company or individual has such a broad picture of the particular industry as the representative of the trade association.

While the Department of Justice has frowned on such representation in the past, a change appears to be taking place. Recently, Attorney General Herbert Brownell Jr., speaking before the Trade Association section of the United States Chamber of Commerce, made this suggestion:

"To safeguard against antitrust involvement, the Department of Justice has suggested the following standards for operation of industry advisory committees. First: that such groups are necessary to perform prescribed statutory duties. Second: the agenda for committee meetings must be administered and formulated by Government representatives. Third: meetings should be called and chaired by fulltime government officials. Fourth: at such meetings, full and complete minutes should be kept. Fifth: any conclusions reached should, of course, be purely advisory, with final decisions as to action left solely in the hands of government representatives."

He then followed with these significant words. "If these safeguards are followed, this department raises no objection to trade association representatives serving on the advisory groups."

—o—

Honor Founder: A memorial statue to the late John J. Egan, founder of the American Cast Iron Pipe Co., Birmingham, was dedicated on Mr. Egan's birthday anniversary, Apr. 22. The beautiful statue has been erected

at the plant entrance as a tribute from Acipco employees. Walker Hancock Jr., a noted American sculptor, executed the work in Italy.

—o—

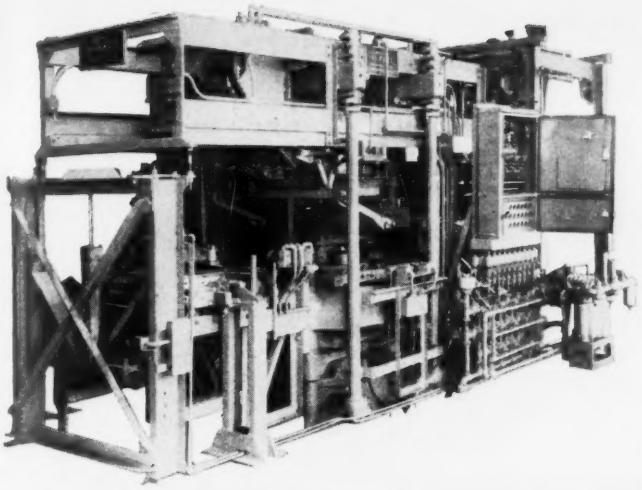
Speakers: Foundry organizations arranging programs on various phases of foundry operations which relate to equipment will be interested to know that C. R. Heller, executive secretary, Foundry Equipment Manufacturers' Association, One Thomas Circle, Washington, D. C., has prepared a list of available speakers from a number of member companies.

—o—

How: The following from the July 6 issue of the *Lima (O.) News* tells the whole story:

When in Indian country, don't do as the Indians do!

J. L. Crouse, secretary-treasurer of the Ohio Steel Foundry Co., discovered this about 10 days ago while on a fishing trip near Winnipeg, Canada,



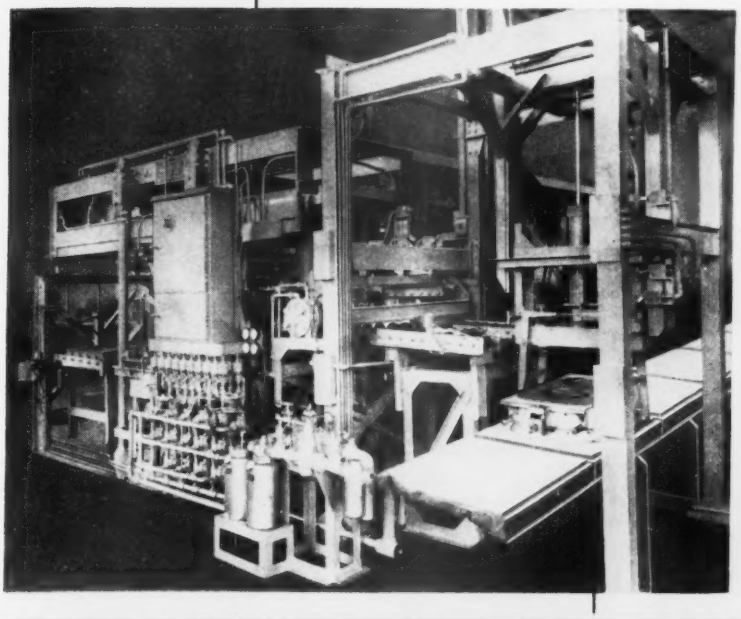
SHOWS FLASK ON FEED-IN ELEVATOR

"Push-Button" Operation Means The Ultimate in

INCREASED PRODUCTION . . .

ECONOMY . . .

QUALITY MOLDS



SHOWS COMPLETED MOLD AFTER BEING TURNED OVER. AUTOMATICALLY TRANSFERRED TO MOLD CONVEYOR. MOLDING CYCLE, 15 SECONDS.

Every Nicholls Molding Machine is precision-built to insure the production of *continuously* better molds. They eliminate guess-work and costly mistakes. They put an end to dangerous risks. They effect major savings in materials and maintenance costs.

This new #24 type C machine has a pneumatic pattern draw, is equipped with an air-operated car type squeeze head, built-in flask roll-in, roll-out device and a measuring sand hopper. Other Nicholls advantages include a flask indexing device and sand spill upset; flask feed-in elevator; mold turnover and transfer... PLUS full "push-button" automatic operation.

Wm. H. Nicholls Co., Inc., Richmond Hill 18, Long Island, N. Y.

Always rely on "Nicholls" for the best in heavy-duty molding machines

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HAUSFELD
FURNACES

FOR GAS
OR FUEL OIL

ARE MEETING EVERY EXACTING REQUIREMENT

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

HAVE YOU INVESTIGATED THEM FOR YOUR MELTING PROBLEMS?

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

with a group of foundry officials.

It seems the guides up there are Indians. And Crouse, it seems, was interested in how they live.

He was seated on the ground, talking to some Indian children, when it happened. Noticing the way the Indian tots rose from their cross-legged position, Crouse decided to try it too.

Half way up his foot slipped in the sand. He fell and broke a leg.

With him on the trip were Robert F. Galvin, Ohio Steel president, and Charles Flanigan and George Griffiths, Ohio Steel sales representatives.

—o—

The Delports: I am happy to present a photograph of Vincent Delport, European manager of FOUNDRY, and Mrs. Delport, taken at the recent International Foundry Congress in London. Vincent and Suzanne are well

known to foundrymen attending International Congresses in Britain and on the Continent and were members of the English party attending the International Foundry Congress at Atlantic City in 1952.

—o—

Complete Coverage: You probably had not realized the fact, but your favorite business publication and your efficient trade associations serve an important function in the field of communications. This was stressed recently by Donald R. Burgess, director, Office of Publications, Department of Commerce, in a talk at the Third Ohio State University Conference on Communication Research and Training in Business and Industry. The comment was as follows:

"Now that you have heard about some of the Department of Commerce's communications problems, I am happy to tell you that three-quarters or more of them are solved for us by the business press and by business associations. The adaptation to specialized uses of our basic economic data, our technology, our science, our world trade information, our marketing statistics, and our other material is promptly, accurately and intelligently achieved by these two service groups. Moreover, the business press solves for us the problem of reaching all departments and all administrative levels in all lines of business." F.G.S.

Monsanto Profit Pictures

Shell molds bonded with Resinox 736 produce smooth-surface castings which need no grinding to eliminate fins.

Link-Belt Company reports: Sharper detail, smoother finish with **Resinox 736**

MONSANTO'S PHENOLIC RESIN HELPS DELIVER MORE GOOD CASTINGS PER TON OF METAL POURED

The superior performance of Resinox 736 has been demonstrated again in one of the nation's leading foundries.

In a three-year test at Link-Belt Company's Ewart plant in Indianapolis, Resinox 736 proved to have the right combination of properties to shell mold precision parts at fast production rates.

Molds bonded with various resins were compared for speed of investment, speed of cure, dimensional stability, tensile strength and resistance to heat shock. The experiments proved Resinox 736 did the job better than any other resin now available. Link-Belt reports getting castings with sharper detail and smoother finish. Machining costs are greatly reduced—often eliminated altogether.

With the economy and quality of shell molding depending so much on the resin used, it will pay *you* to specify Resinox 736.

For a complete line of shell molding, core binding and sand conditioning resins that are research-developed and shop-tested to meet your needs, write to Monsanto Chemical Company, Plastics Division, Dept. **FO-9**, Springfield 2, Mass.

Sprockets cast by Link-Belt Co. in Resinox-bonded shell molds require no machining before threading.

MONSANTO®

For Stronger shell molds, specify

RESINOX®

"Test bar trouble again!!!"

Don't get angry—get our new booklet "How to Make Good Test Bars".

Written especially for foundry and personnel, it covers designing, melting, pouring and handling of test bars (and it's illustrated, too).

Your personnel will get plenty of practical information and time-saving hints from this booklet. It's available without obligation . . . just write to our Metallurgical department for copies.

This is one of the research and service facilities offered to industry by the Geo. Sall Metals Co. Our Metallurgical staff is always at your service, and will be glad to consult with you (in person or by telephone) on any matter related to non-ferrous metals. We will also create and produce special alloys for any special requirements you may require.

For superior service in non-ferrous metals, call SALL . . .

"Better Alloys for Better Castings Through Creative Metallurgy"

The George Sall Metals Co., Inc.

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PRODUCERS OF: Aluminum, Brass and Bronze and Zinc Alloy Ingot; Hardeners, Z-shot and bar for Zamak production; Salloy; Special Alloys

CALENDAR of Meetings

Sept. 6-17—National Machine Tool Builders Association, machine tool show, International Amphitheater, Chicago.

Sept. 6-17—Coliseum Machinery Show, Chicago Coliseum, Chicago.

Sept. 6-17—Production Engineering Show, Navy Pier, Chicago.

Sept. 12-16—Industrial Engineering Conference, Michigan State University, East Lansing, Mich.

Sept. 12-16—Instrument Society of America, instrument conference and exhibit, Shrine Exposition Hall and Auditorium, Los Angeles.

Sept. 29-30—Missouri Valley Regional Foundry Conference, sponsored by St. Louis, Tri-State, and Mo-Kan Chapters of AFS and Missouri School of Mines Student Chapter, at Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 14-15—New England Foundrymen's Association, Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 14-16—Northwest Regional Foundry Conference, Portland, Oreg.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—American Coke & Coal Chemicals Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia.

Oct. 17-21—National Safety Council, national safety congress and exposition, Conrad Hilton, Congress, Morrison and LaSalle Hotels, Chicago.

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee.

Oct. 20-21—Ohio Regional Foundry Conference, sponsored by Ohio AFS chapters, Case Institute of Technology, Cleveland.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Nov. 1-3—Investment Casting Institute, fall meeting, Sheraton-Cadillac Hotel, Detroit.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting, Statler Hotel, Buffalo.

Nov. 3-4—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 16-18—Steel Founders' Society, annual Technical and Operating Conference, Hotel Carter, Cleveland.

Dec. 1-2—Michigan Regional Foundry Conference, Michigan State University, East Lansing, Mich.

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh.

1956

Feb. 9-10—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

Feb. 16-17—Southeastern Regional Foundry Conference, sponsored by Birmingham and Tennessee Chapters, AFS, Tutwiler Hotel, Birmingham.

Mar. 7-8—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland.

Mar. 19-20—Steel Founders' Society, annual meeting, Drake Hotel, Chicago.

May 3-9—American Foundrymen's Society, annual convention and exhibition, Convention Hall, Atlantic City, N. J.

June 5-8—Materials Handling Institute, materials handling exposition, Public Auditorium, Cleveland.

What about modernizing *your* blast cleaning operation? Send for free copy of Bulletin 227 today! Write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

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BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

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Special Blast Rooms & Cabinets

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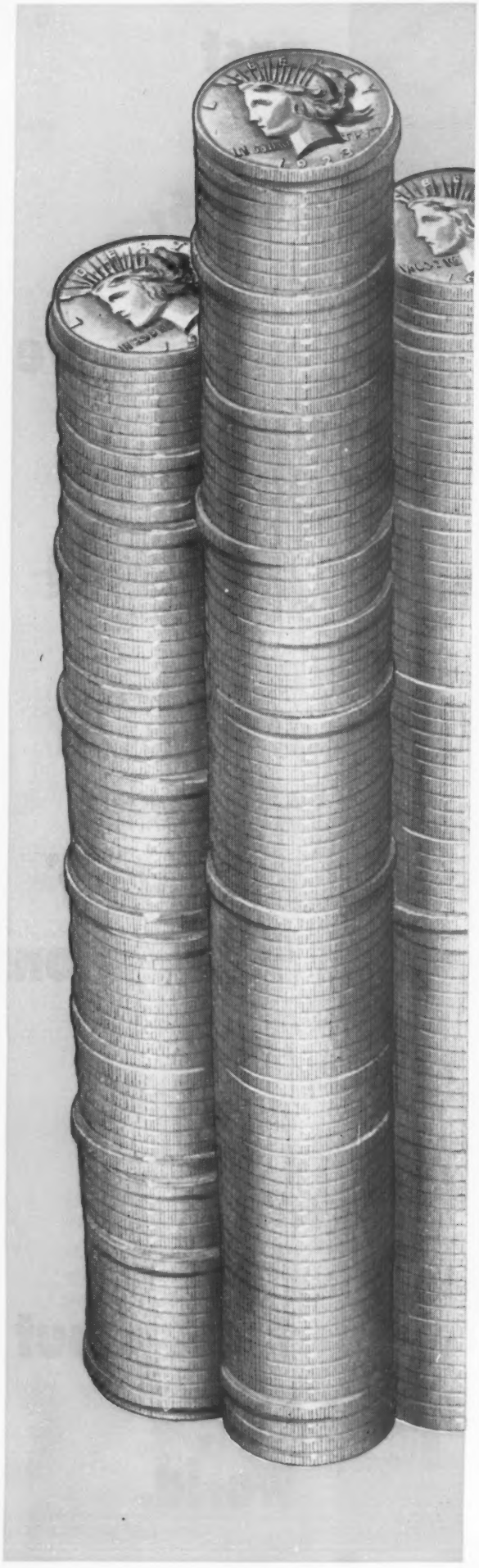
Malleabrasive Shot & Grit

In the past five years, the automotive industry has purchased 58 Pangborn Monorail Rotoblast® Installations for use in plants throughout the world.



Want to really cut costs in your cleaning room?

switch to

CINCINNATI PD SNAGGING WHEELS

CINCINNATI (PD) SNAGGING WHEELS—the greatest grinding wheel development in years—will absolutely cut costs in your cleaning room . . . saving you money four important ways:

- FREER CUTTING—You can get more pounds of metal per hour with the grains and bonds specified by Cincinnati for your snagging jobs. Operators like the fast, easy cutting action of CINCINNATI (PD) WHEELS.

- SELF-DRESSING ACTION—The CINCINNATI (PD) WHEELS specified for your job by CINCINNATI abrasive engineers require few, if any, dressings. With the right grade wheel, new cutting grits are bared as soon as old grits get dull and inefficient.

- LONGER WHEEL LIFE—Through longer life of CINCINNATI (PD) WHEELS, users have reported almost *double* the production per wheel. One customer, using a portable grinder, gets almost *twice* the life with a CINCINNATI (PD) Flared Cup. Another user, snagging cylinder blocks on a swing frame, has increased the production per wheel 45% with (PD) WHEELS.

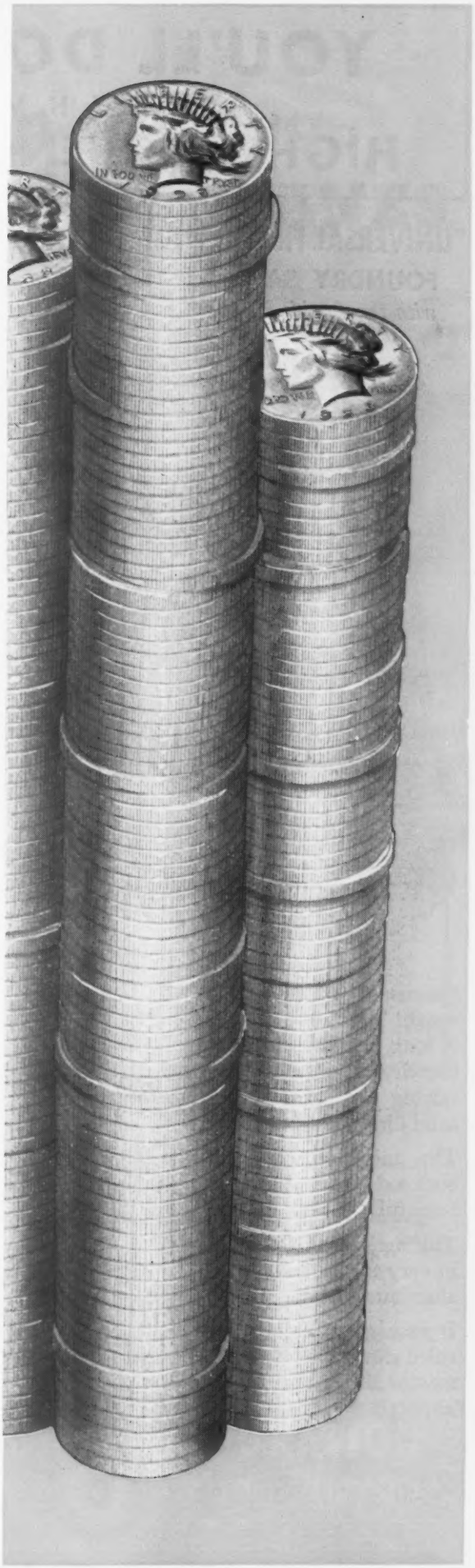
- POSITIVE DUPLICATION (PD)—"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *Yet these better, cost-cutting* CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

We'll be happy to prove to you how CINCINNATI (PD) WHEELS can increase your production and cut costs and time in your cleaning room. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.



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YOU'LL DO A BETTER JOB

with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

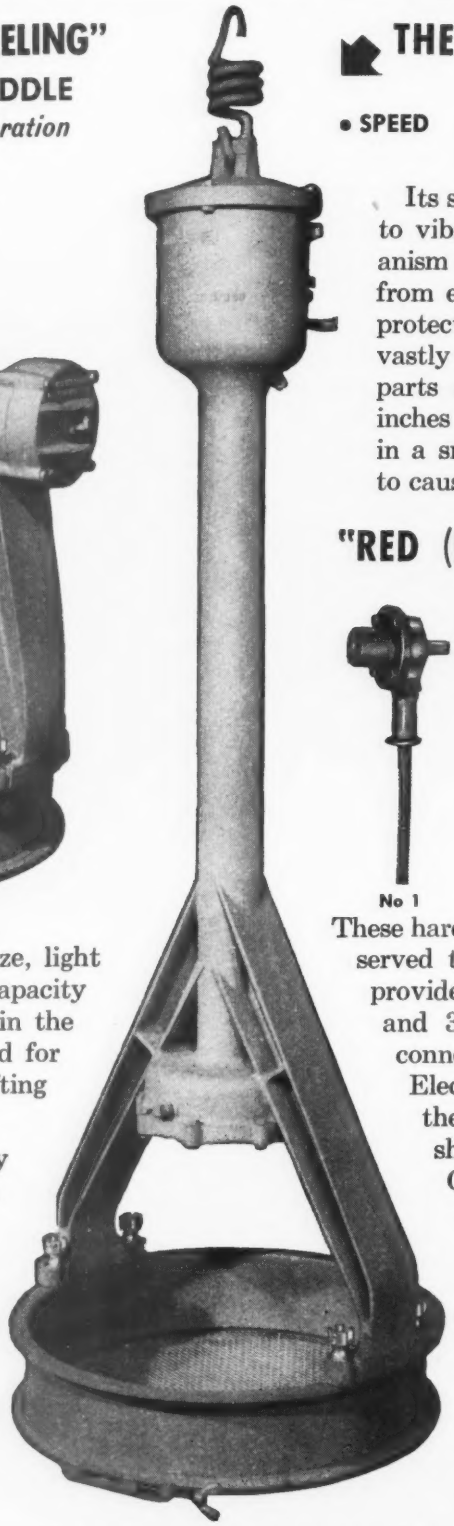
with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



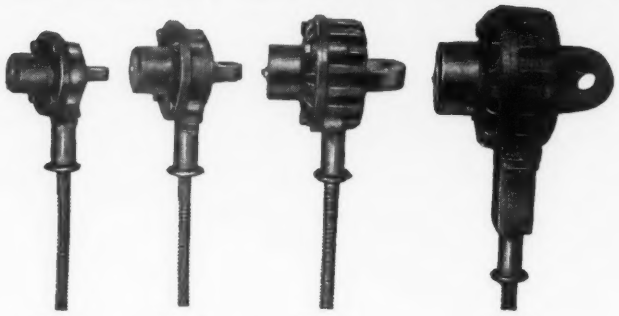
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

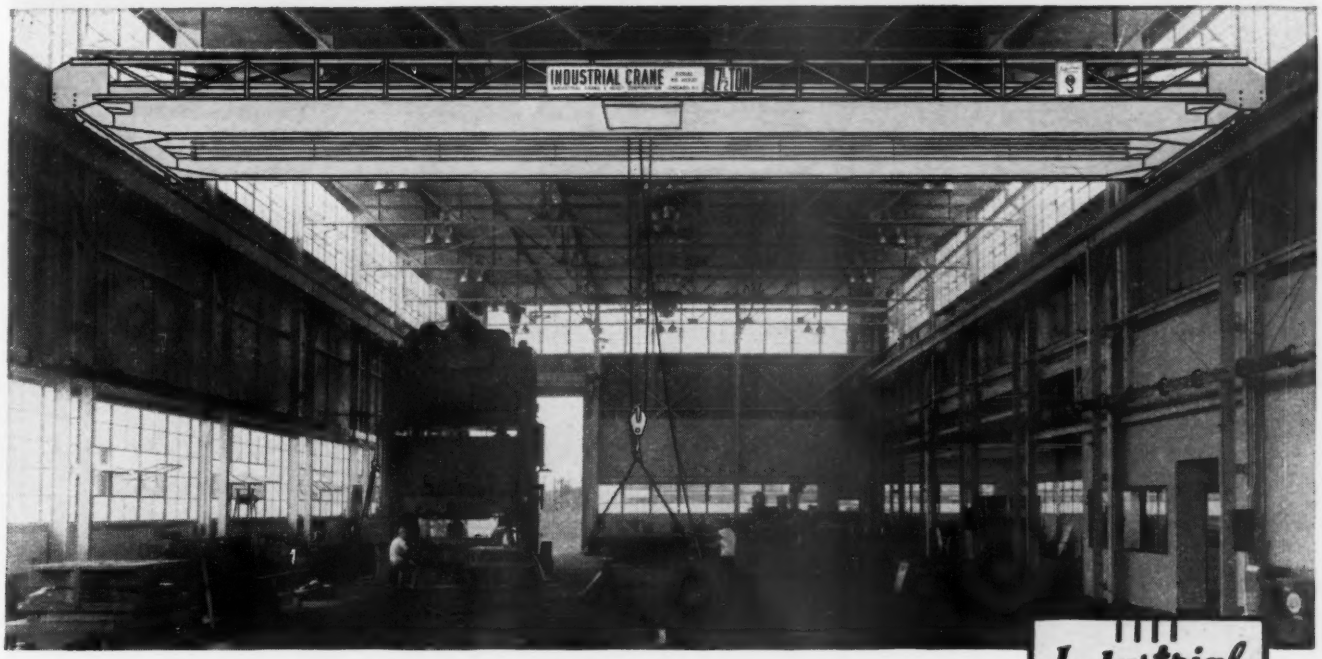
ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Industrial top-running MOTOR DRIVEN CRANES are Better Values



The Industrial 7½ ton crane in photo is equipped with 5 step variable speed push button control to facilitate delicate handling of expensive dies.

Industrial CRANES

The high quality built into Industrial Cranes means more production and less down time to the user. A glance at a few of the outstanding features will show you the better value that is built into every Industrial Motor driven crane. The best crane for the long run.

- **Rolled Forged Steel, heat treated wheels.***
- **Long-life, precision ball and roller bearings throughout.**
- **All welded, precision jig-bored end trucks for true smooth operation.**
- **Two large size gusset plates at each end-truck assuring permanent squareness.**
- **Rugged type outrigger for additional lateral strength.**
- **Special push button control for efficient operation from floor or cab control.**
- **All Industrial cranes including underhung types designed for easy erection at job site.**

*Standard on heavy duty models

Consult with Industrial Crane & Hoist for assistance in solving your Materials Handling Problems

Industrial Motor Driven Cranes are designed for all types of service, in light, regular, and heavy duty models

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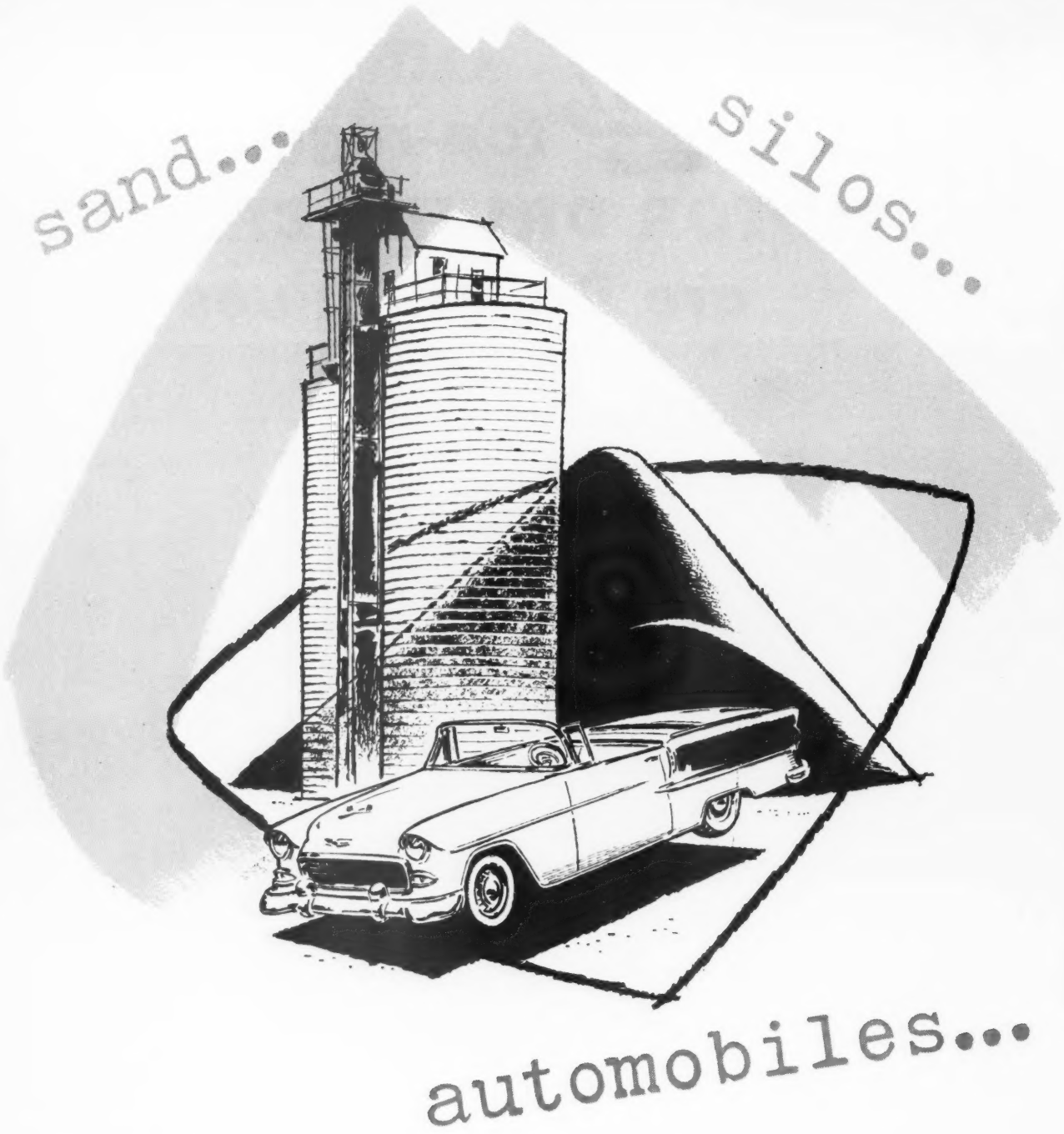


Marietta silos help produce fine cars

Not one . . . but 10 Marietta industrial concrete silos have gone to work at the newest engine foundry of a large automobile manufacturer. The job? . . . efficient storage of 25,000 tons of core sand, greater protection against loss or damage, improvement of handling facilities and lowering operating costs. That's easy for a Marietta-designed storage system, because it's backed by experience in handling all types of bulk materials for many different industries. This unusual indoors installation has a continuous, self-supporting concrete roof over the entire group of silos. Contractor was the John W. Cowper Co., Buffalo, N. Y. Architect was H. E. Beyster & Associates, Inc., Detroit, Mich.

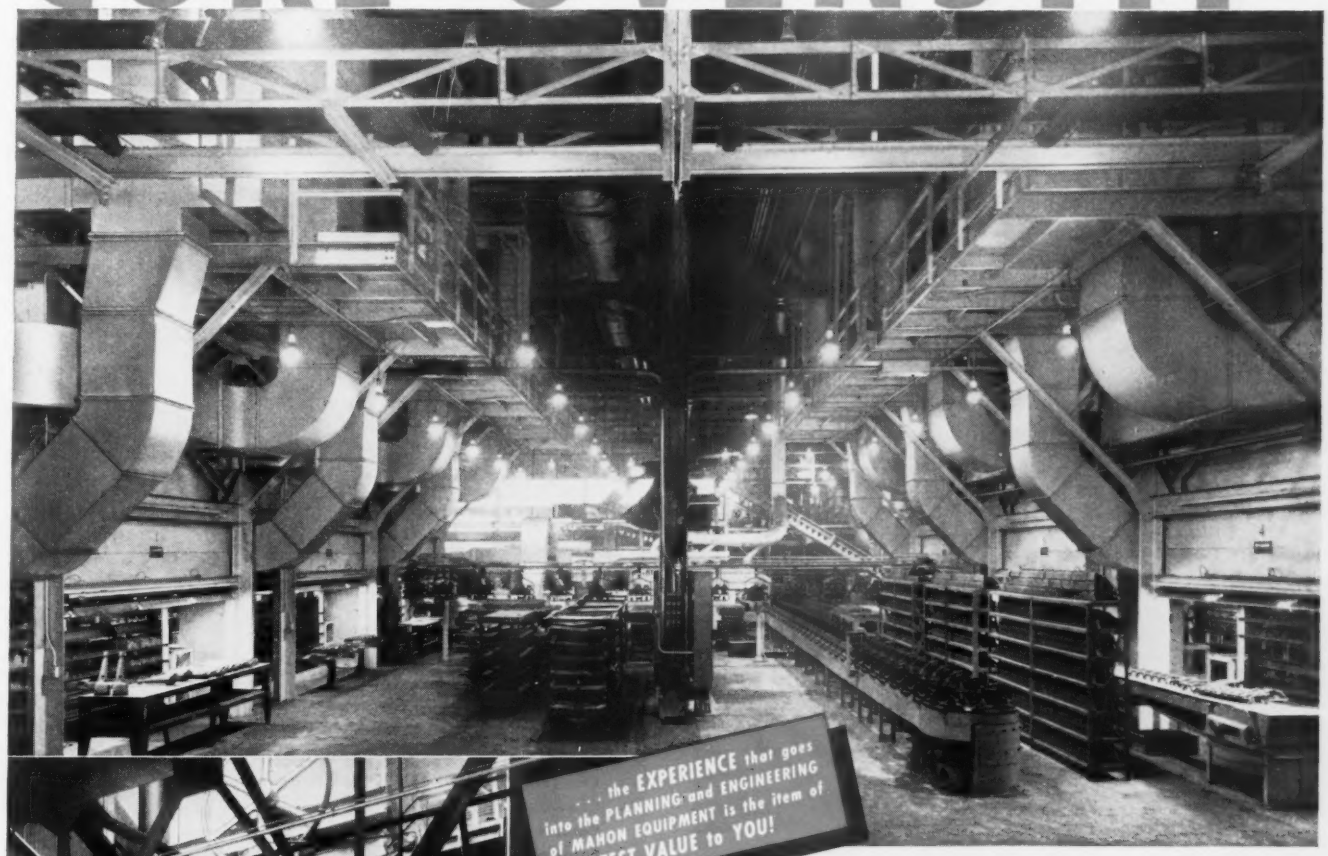
Marietta can produce for you, too. Write, wire or phone today, for the profitable facts on an economical Marietta storage system. Send for your copy of our silo storage catalog.

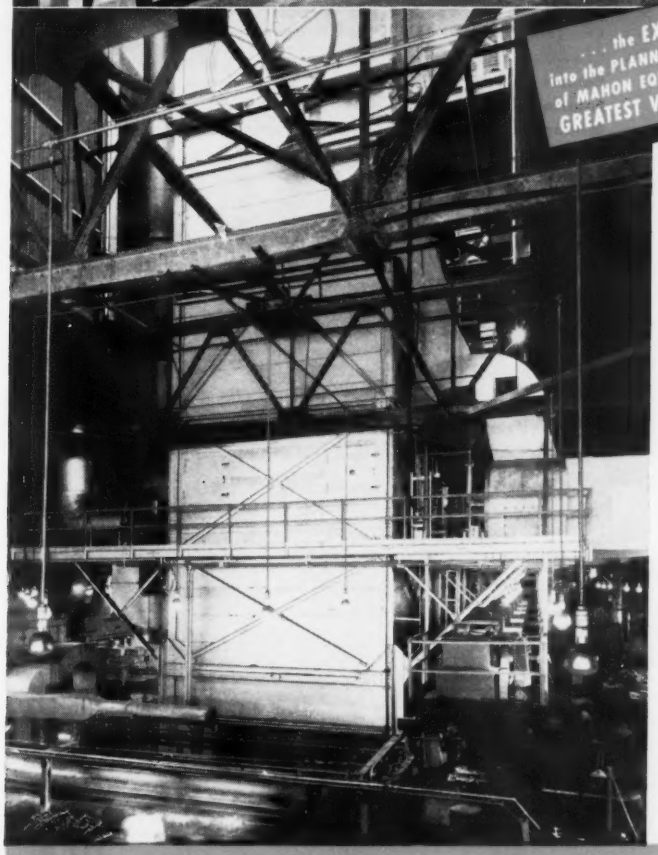
THE Marietta CONCRETE CORPORATION
Marietta, Ohio

BRANCH OFFICES: 501 Fifth Ave., New York 17, N. Y.; Pulaski Hwy. at Race Rd., Baltimore 21, Md.; 411 Foster St., Nashville, Tenn.; Box 5192, Charlotte 6, N. C.; Box 592, Jamestown, N. Y.; Hollywood, Fla. REPRESENTATIVES in principal cities.

Precast concrete products for Farm, Home and Industry

CORE OVENS...





. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

In some of the largest and most modern foundries in the world you will find Mahon Core Ovens and other equipment. The illustrations above and at left show part of a battery of twenty-six Mahon Vertical Core Ovens installed in the foundry of one of the world's largest automobile manufacturers. If you are contemplating new core or mold baking ovens, or core dip and paste drying ovens, you will want to discuss your requirements with Mahon engineers . . . because, you, like many others, will find that Mahon engineers are better qualified through experience to advise you on the type of oven best suited to your particular needs. And, if you wish to compare, you will also find that Mahon Core Ovens, like all other Mahon equipment, are better engineered and better built for more economical operation over a longer period of time—a point you will want to investigate thoroughly before making a capital investment in new production equipment. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-656. And remember, it costs you nothing to discuss your baking and drying equipment requirements with Mahon engineers.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES ENGINEERING OFFICES in NEW YORK and CHICAGO

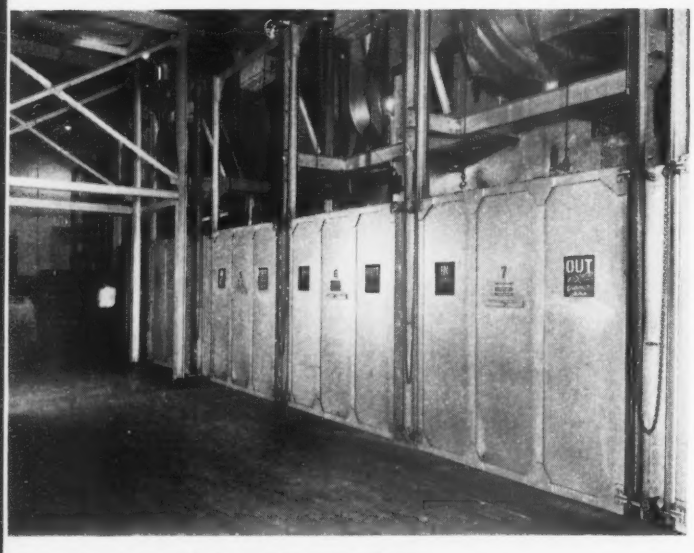
Engineers and Manufacturers of Core and Mold Baking Ovens, Core Dip and Paste Drying Ovens, Mold Spray Booths, Mold Racks, Core Rack Trucks, Sand Storage Bins and Hoppers, Shake-out Hoods, Cooling Tunnels, Dust and Fume Control Equipment and Filtered Air Supply Systems, Metal Cleaning Machines, and many other units of Special Processing and Production Equipment.

MAHON

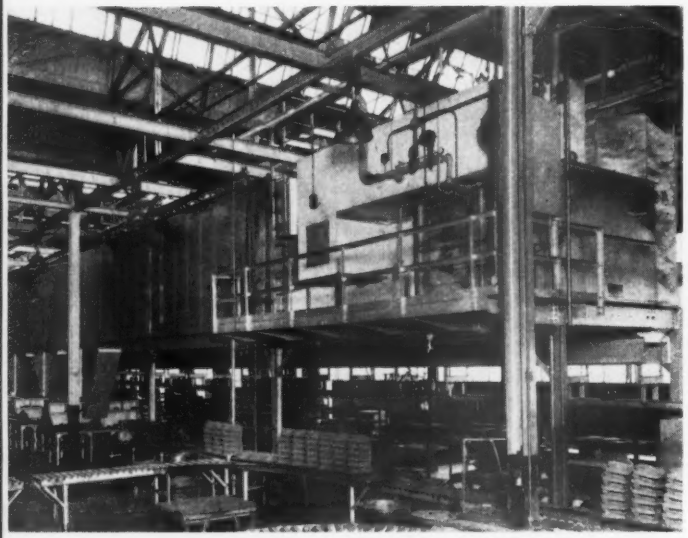
COLEMAN OVENS

Repeatedly Selected

by leading automotive foundries



Coleman Transrack Ovens



Coleman Monorail Conveyor Core Oven

Leading automotive, truck, tractor, agricultural equipment and other high production foundries select Coleman Ovens for maximum production on every core baking and mold drying job. Coleman Ovens are the *accepted standard* for consistently perfect baking and dependable mechanical performance . . . essential to profitable operation.

The superiority of Coleman Ovens is proved by the record of repeat orders from firms such as:

General Motors Corp.
Buick Motor Div.
Cadillac Motor Div.
Chevrolet Saginaw Foundry
Chevrolet Tonawanda Foundry
Central Foundry Div.
Fabricast Div.
McKinnon Industries, Ltd.
Pontiac Motor Div.
Ford Motor Co.
Cleveland Foundry Div.
Dearborn Foundry Div.
Ford of Canada, Ltd.
American Motors Corp.
Studebaker-Packard Corp.
American Foundry Co.
C. W. & C. Foundry Co.
G. H. R. Foundry Div.
Lakey Foundry & Machine Co.
Lynchburg Foundry Co.
New Haven Foundry Co.
Standard Foundry Co.
Superior Foundry, Inc.
Wilson Foundry & Machine Co.
Wheland Co.
Allyne-Ryan Foundry Co.
Allis-Chalmers Manufacturing Co.
Mack Manufacturing Co.
J. I. Case Company
Deere & Company
Oliver Corp.
International Harvester Co.
Massey-Harris-Ferguson Co.
Minneapolis-Moline Corp.
Caterpillar Tractor Co.
Etc.

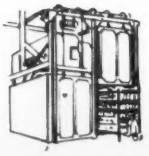
More than half a century of specialized oven engineering "know-how" goes into every Coleman Oven. This is your assurance that the Coleman Oven recommended will do your work to your complete satisfaction. Call our experienced oven engineers for unbiased, practical advice on your particular requirements.

✻ *Write for Bulletin 54*

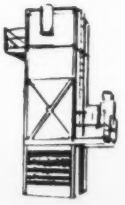
Let us recommend the RIGHT type of core or mold oven for your requirements — we make them all.

COLEMAN PORTABLE CORE OVENS

COLEMAN ROLLING DRAWER CORE OVENS

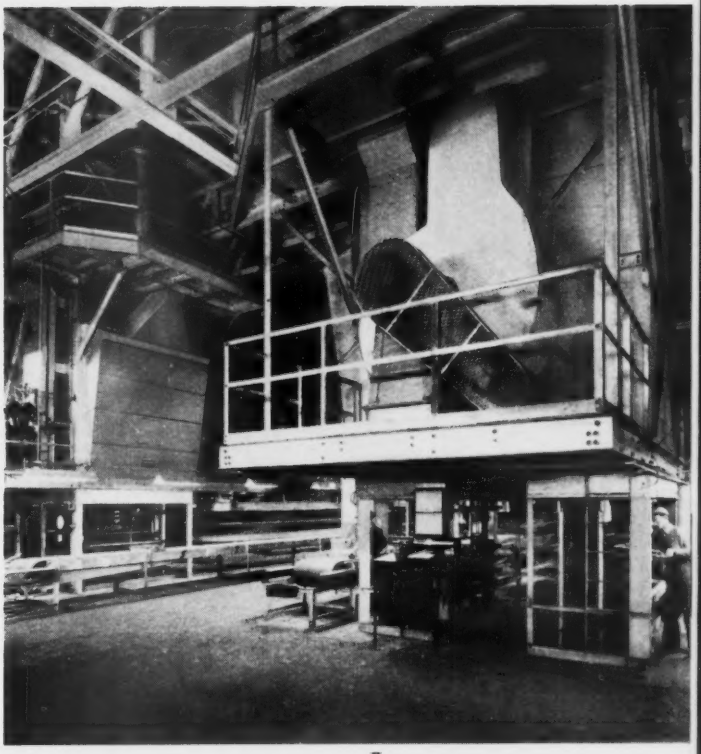


COLEMAN TRANSRACK CORE OVENS

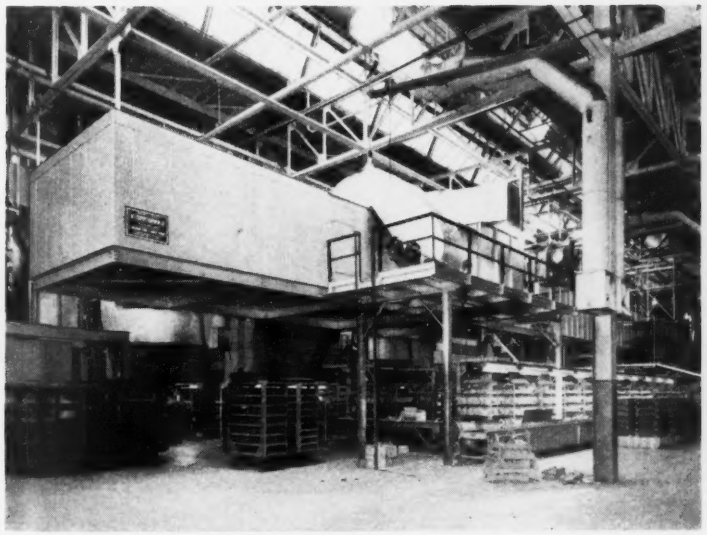


COLEMAN TOWER CORE OVENS

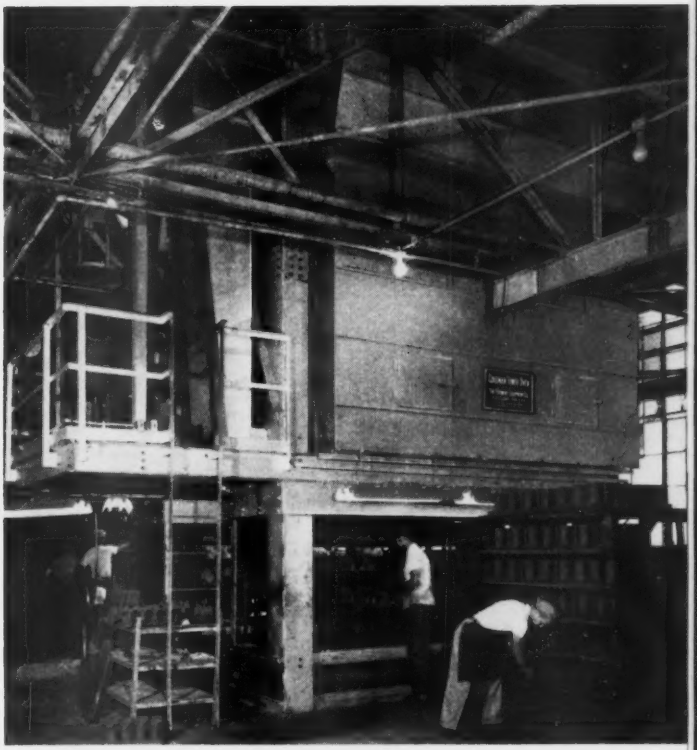
Coleman Tower® Core Oven



Coleman Tower® Core Ovens



Coleman Monorail Conveyor Core Oven

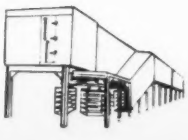


Coleman Tower® Core Oven

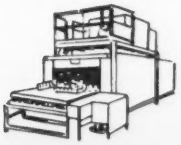
THE FOUNDRY EQUIPMENT COMPANY

1821 Columbus Road — Cleveland 13, Ohio

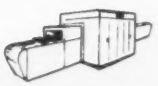
World's Oldest and Largest Foundry Oven Specialists



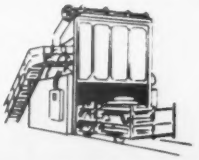
COLEMAN HORIZONTAL CONVEYOR CORE OVENS



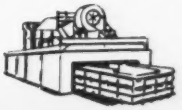
COLEMAN CONVEYOR REDRY OVENS



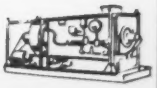
COLEMAN DIELECTRIC CORE OVENS



COLEMAN CAR-TYPE OVENS



COLEMAN HIGH-SPEED MOLD OVENS



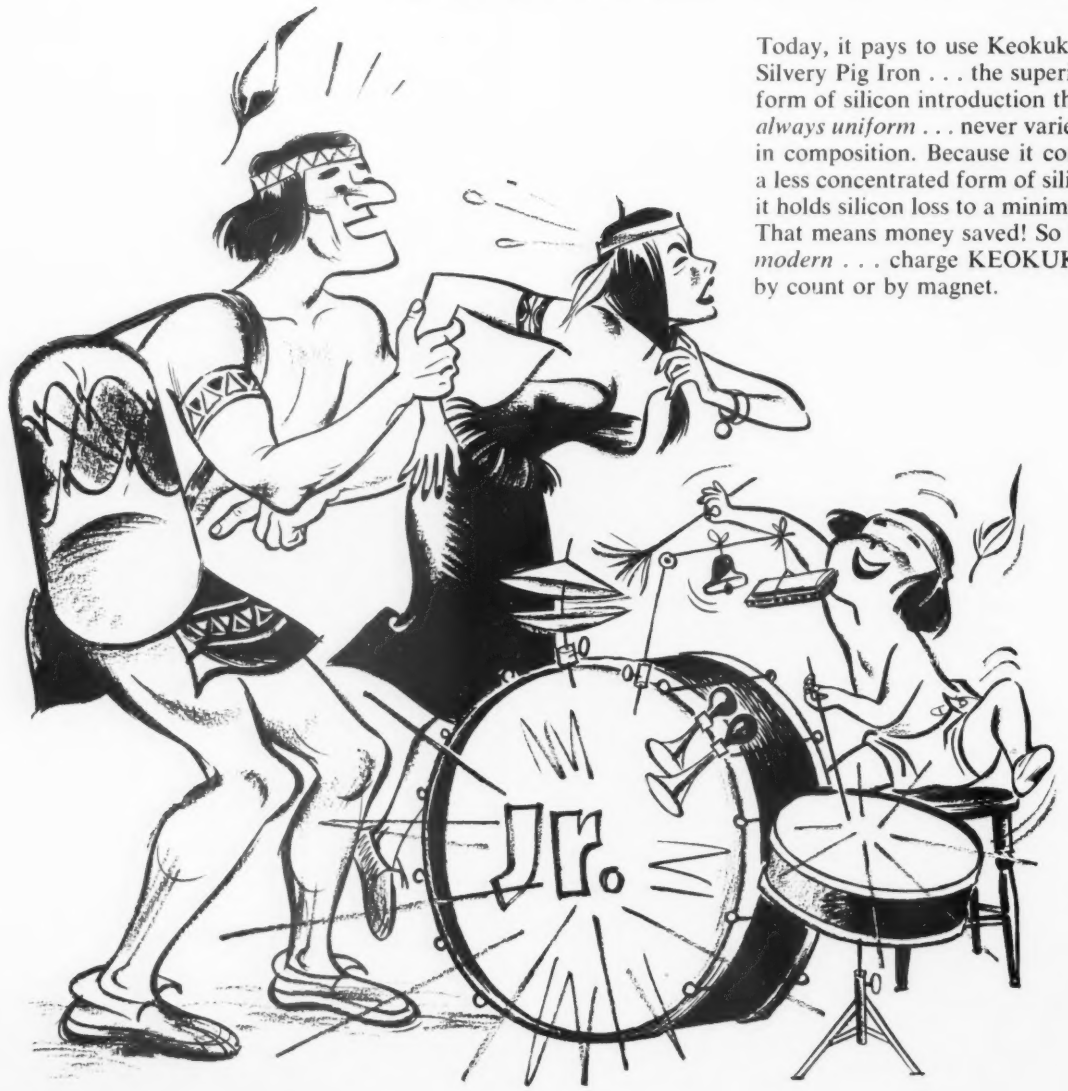
COLEMAN PORTABLE MOLD DRYERS

CRAZY, MAN !

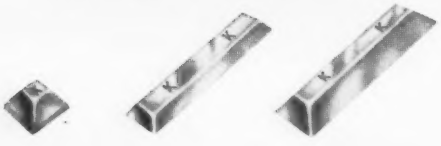
[or why it pays to use KEOKUK Silvery Pig]

Chief Keokuk: "Me try teach Little Chief Injun drum. Him say him already cool and gone the most. What him mean?"

Princess Wenatchee: "Junior sends a real modern message!"



Today, it pays to use Keokuk Silvery Pig Iron . . . the superior form of silicon introduction that's *always uniform* . . . never varies in composition. Because it contains a less concentrated form of silicon, it holds silicon loss to a minimum. That means money saved! So be *modern* . . . charge KEOKUK by count or by magnet.



SITUATION UNDER CONTROL BY KEOKUK

KEOKUK, IOWA

Wenatchee Division, Wenatchee, Washington

SALES AGENT: MILLER AND COMPANY

332 S. Michigan Avenue, Chicago 4, Illinois

3504 Carew Tower, Cincinnati 2, Ohio

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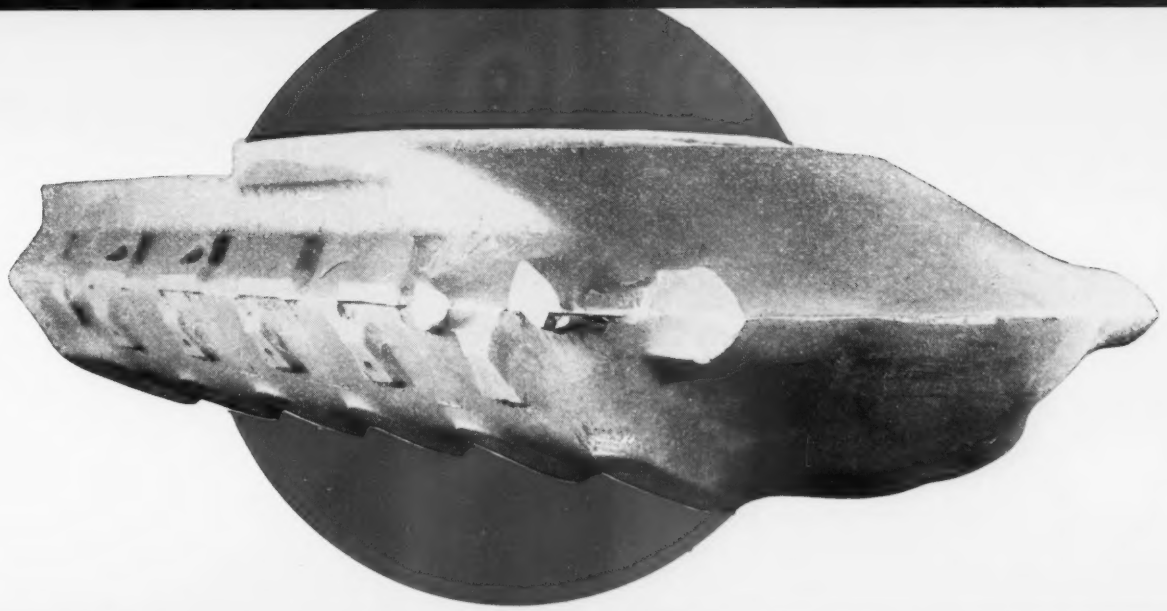
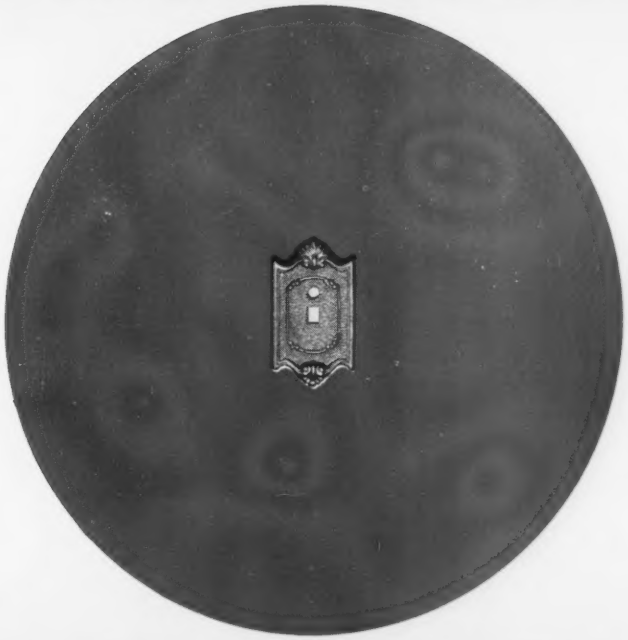
Keokuk Silvery . . . the superior form of silicon introduction . . . available in 60 and 30 pound pigs and 12½ pound piglets...in regular or alloy analysis. Keokuk also manufactures high silicon metal.



ou make big savings on any size casting with WHEELABRATOR® cleaning



Whether your cleaning problems come by the ounce or by the ton, Wheelabrator airless blast cleaning will provide a cost-slashing solution.

Mammoth tank hulls, as illustrated, are cleaned in a Wheelabrator Car-Type Room in just 40 minutes. This job had previously required two airblast operators 7 to 9 hours at a prominent steel foundry.

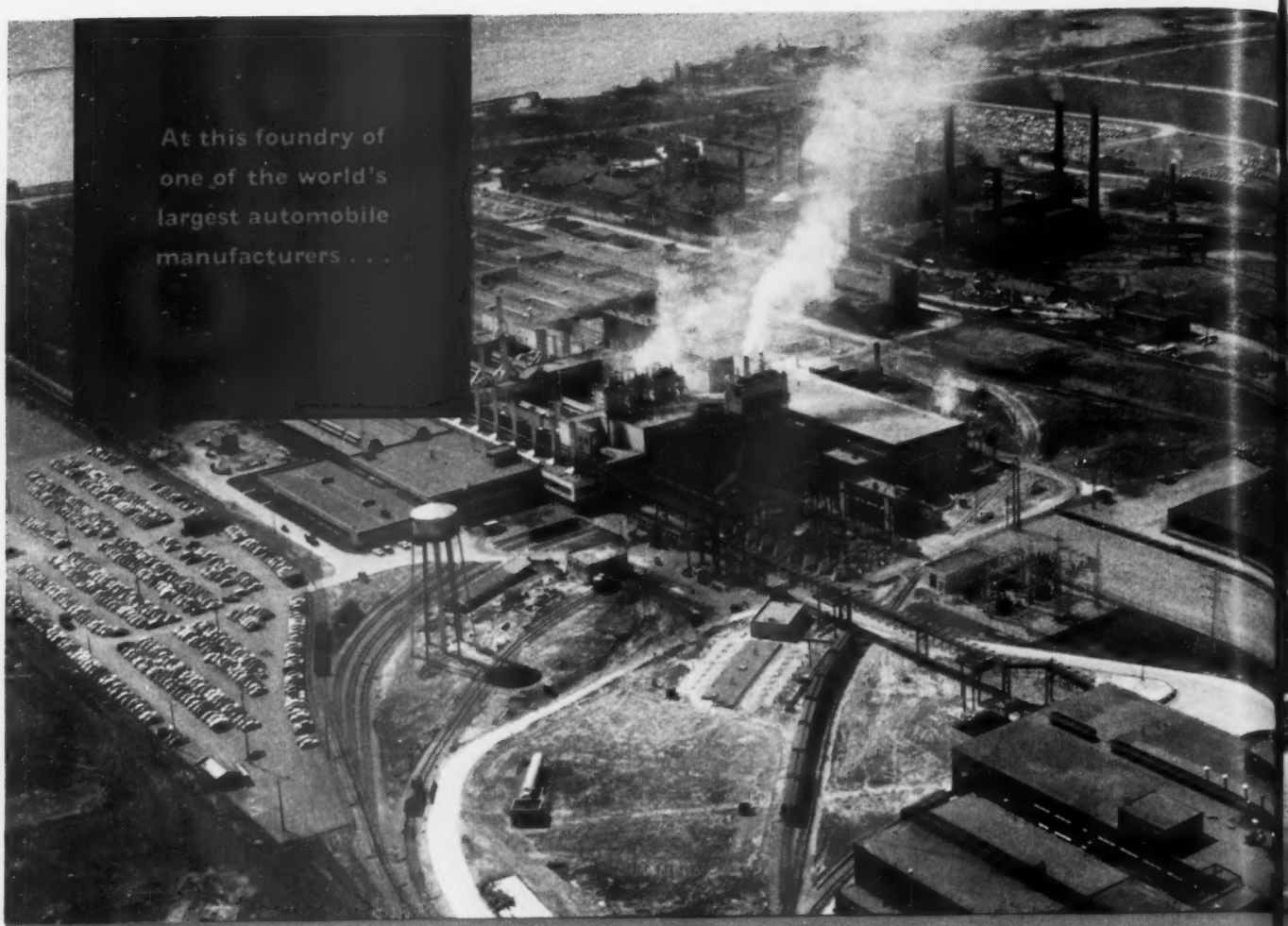
At the other size extreme, pay loads of very small castings are cleaned in record time at big savings. For instance, sand is removed from 350 small bronze castings, as illustrated, in 15 minutes in a Wheelabrator Tumblast at National Brass Co. — a 5 to 6 hour job by airblasting.

The universal acceptance of the airless Wheelabrator for practically every conceivable cleaning application is the result of its many cost-cutting advantages and original design features. For expert counsel and the right equipment for your cleaning problem, look to Wheelabrator for the profitable solution. Write now for Catalog No. 74-C.

WHEELABRATOR
CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)

505 S. Byrkit St., Mishawaka, Indiana

Trail Blazer of Industrial Progress



. . . All of the core and facing sand is prepared in six Simpson Mix-Mullers

ACRES OF CORES bear evidence of productive capacity of this efficient modern foundry operation.

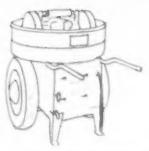
• Evidence of the importance of foundry operations in the future plans of the auto industry is found in the extensive, modern facilities operated by these two industry leaders in the automotive field.

In evidence too—as they are in the foundries of every major auto producer, is the Simpson Mix-Muller.

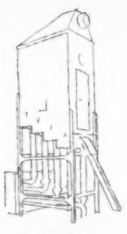
The mass production of increased horsepower, high compression—high fuel economy engines, calls for close tolerances, smooth interior casting finish and a core sand quality which will assure accuracy to pattern—density of strength.

. . . PRODUCTS OF THE PRACTICAL FOUNDRYMAN . . .

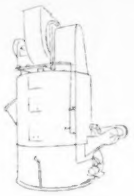
SIMPSON MIX-MULLERS
25 to 4000 lb. batch capacity



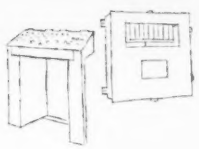
SIMPSON PORTO-MULLER
250 lb. capacity (100% portable)



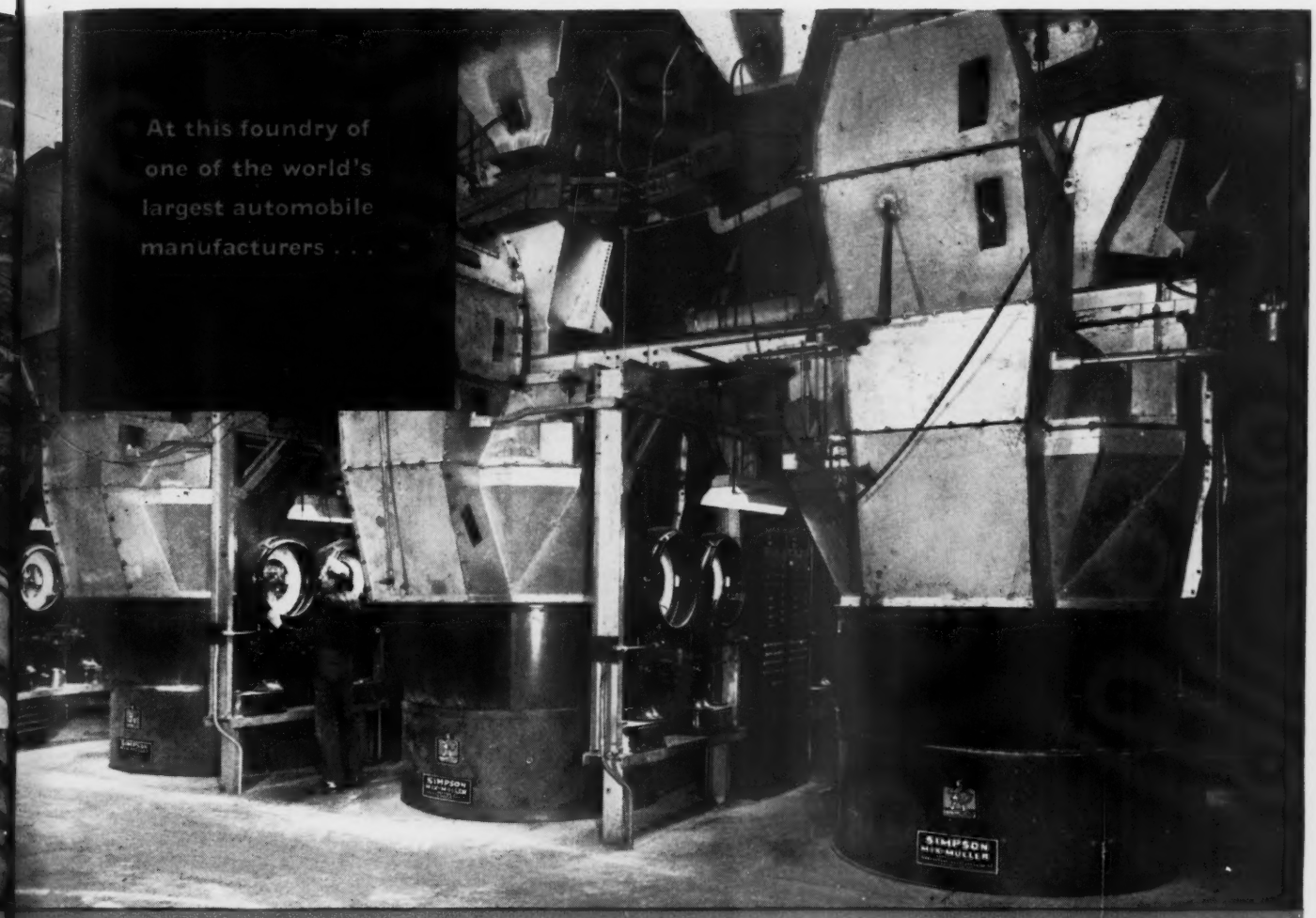
NATIONAL SAND RECOVERY SYSTEM
Practical pneumatic sand scrubber



NATIONAL HYDRO-FILTER
Wet-type dust collector



NATIONAL TIMEMASTER
Console and unit mounted
Automatic cycle controls.



. . . All of the core sand is prepared in eight Simpson Mix-Mullers

Whether you're producing engines or pipe ells; whether you require six or sixty tons of sand per hour, there's a new, modern Simpson Mix-Muller that can give you the most thorough mulling action ever developed.

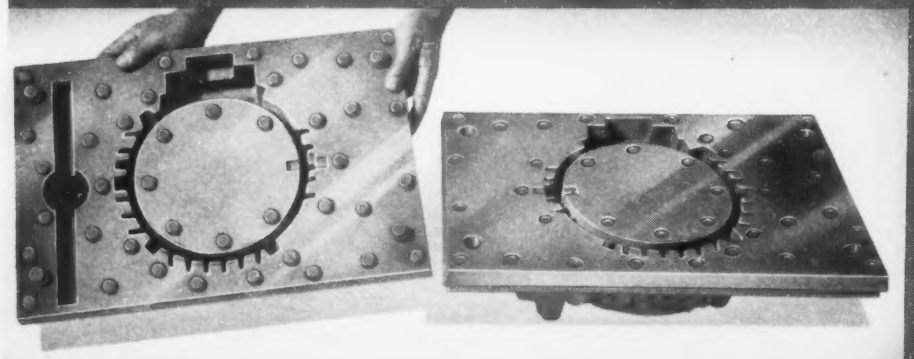
Write for bulletin 489 describing all models of the Simpson Mix-Muller available in a range of from 25 to 4000 lb. batch capacity.

CLOSE-UP shows use of cores in engine block casting.

National Engineering Company
(Not Inc.)
646 Machinery Hall Bldg. • Chicago 6, Illinois

FOR FASTER CURES . . . SMOOTHER SURFACES . . . BETTER CASTINGS

CATALIN Shell Molding Resin 9616



FOR FAST DELIVERIES . . . *Catalin maintains three strategically located resin plants . . .*

The production advantages of the shell molding process have made a most important impact upon both the large and the small foundry. Its future is assured. New automatic machines and resin binders to keep pace with their speed are well past the laboratory stage.

Catalin Resin 9616, a phenol-formaldehyde, powdered, two-stage resin, has been specifically developed to bond the fine-grained sands used in the Shell Molding process.

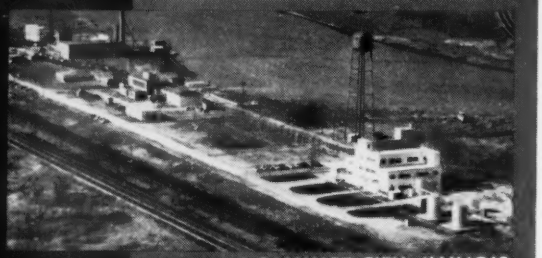
This economical resin produces high-speed curing rates with the minimum of resin content. Savings are achieved in time, sand, work space, handling and metal. Castings are more accurate and smoother—require considerably less finishing.

In addition to Shell Molding Resin 9616, Catalin produces a wide range of core binding liquid resins and powders for the production of ferrous and non-ferrous metal castings.

Catalin representatives, familiar with the requirements of the foundry industry, are available for consultation. Samples on request! Write . . .

at FORDS, NEW JERSEY

THOMASVILLE, NORTH CAROLINA



and CALUMET CITY, ILLINOIS

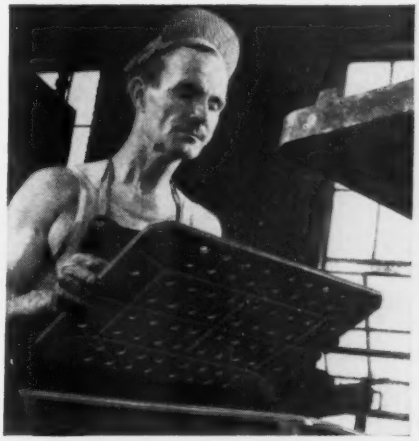
CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE, NEW YORK, N. Y.

Catalin

branch offices:
CHICAGO, ILL., 221 No. LaSalle Street
GREENSBORO, N. C., 630 Southeastern Bldg.

Memo to foundry superintendents:

Don't worry about rough and tough handling of Edco Dowmetal Bottom Boards. They won't break. In fact, use 'em over and over again (they're permanent equipment). They stand up under constant use → —keep casting quality up, too. Call Edco next time you need "the right Bottom Board"—



Write for more information ... and the list of 83 standard Edco sizes available from stock—

EDCO CHRISTIANSEN CORPORATION

Christiansen Corporation

210 S. Marion St. · · Oak Park 1, Illinois

Edco Dowmetal Bottom Boards · Edco Aluminum Ingot

Research dollars working for you... a continuing aid to industry from ELECTROMET

ELECTROMET's *research laboratories spend millions of dollars to develop new and improved alloys for better steels—and you receive the benefits.*

More than 300 skilled research scientists, engineers, and technicians work in ELECTROMET's Metals Research Laboratories on the solution of metallurgical problems. They develop new and improved ferro-alloys and metals, better ways of using them, and new and improved alloy steels and irons.

ELECTROMET conducts this continuing research program as a bonus for you, to provide high-quality ferro-alloys and valuable technical service.

You can profit from this continuing research program. For help on your problems in the use of ferro-alloys or the metallurgy of alloy steels or irons, please contact the nearest ELECTROMET office listed below.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

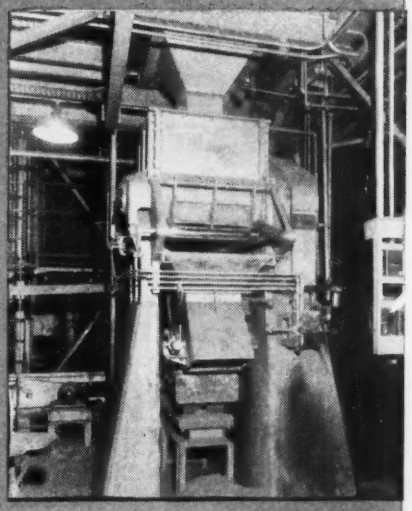
ELECTRO METALLURGICAL COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco
In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

Electromet
TRADE MARK
Ferro-Alloys and Metals

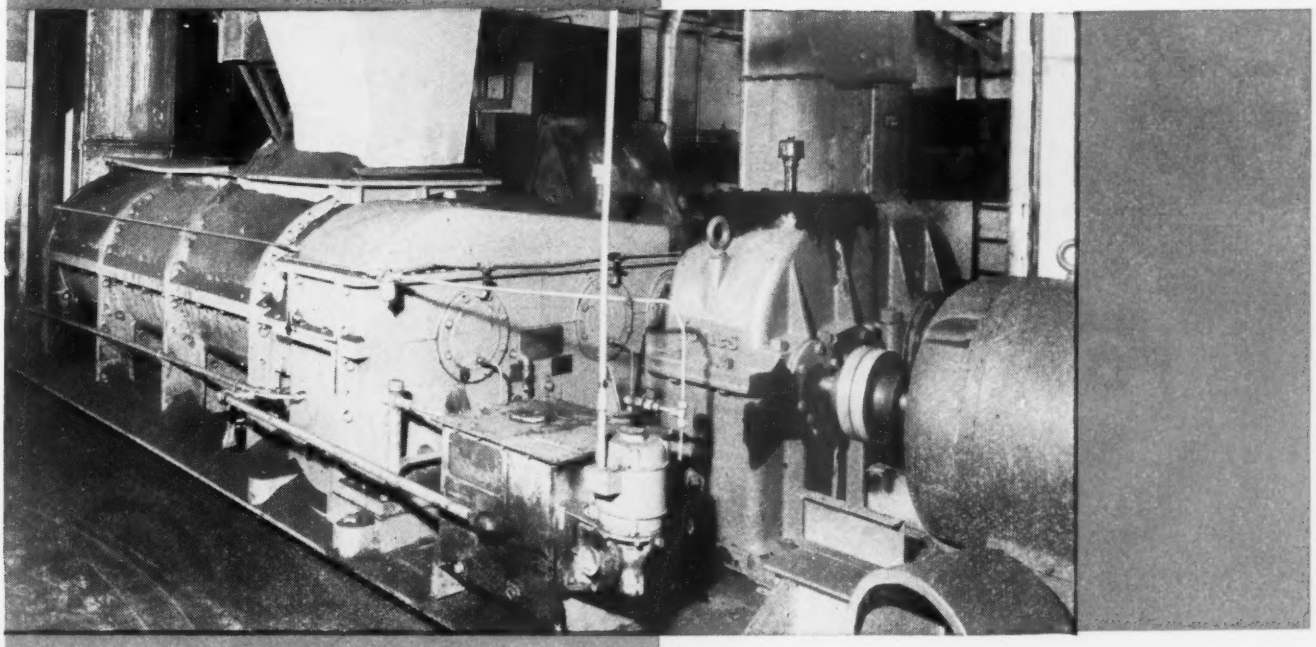
8 BAKER PERKINS UNITS

handle the sand mulling, core wash mixing, core paste mixing and refractory clay mixing in big new foundry

The eight Baker Perkins units installed in this new automotive grey iron foundry were chosen for their industry-proven excellence and efficiency. For sand mulling, five B-P 5A Continuous Molding Sand Mullers assure high speed delivery of thoroughly uniform sand mix to the molding floor. The B-P core paste mixer and B-P core wash mixer insure good core surfaces, and the B-P Refractory Clay Mixer is ideal for mixing refractory clay material for mudding up ladles and cupolas. This new foundry will find, as other foundries have found, that B-P equipment is built to last and requires minimum maintenance.



On the job . . . a size 15 B-P Refractory Clay Mixer



One of five B-P 5A Continuous Molding Sand Mullers installed in the new plant.

BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION, SAGINAW, MICHIGAN

FOUNDRY VENTILATION *by* SCHNEIBLE

Features Compensating Air for Building Ventilation Balance

Schneible engineers designed Compensating Air Hoods to provide more and better ventilation in foundries, both summer and winter. The Compensating feature confines air patterns to the immediate work area, thus no drafts to annoy workers or disturbance of building ventilation balance. In summer, hot air can be scavenged from the roof area thus providing more comfortable working conditions. During winter months supply air is taken from outside the building conserving needed plant warm air. In both cases the balance of building air is maintained.

A Schneible Compensating Air Hood System allows complete regulation of all foundry air, with the result that savings are made in power plant operation in winter, while providing the most comfortable working atmosphere in all seasons.

Schneible Uni-flo Compensating Hoods are available for all foundry operations—shakeout, pouring, smoke-off, mold cooling, etc.

Write for bulletin and complete information on Compensating Air Hoods.

CLAUDE B. SCHNEIBLE COMPANY

P. O. Box 81, North End Station • Detroit 2, Michigan

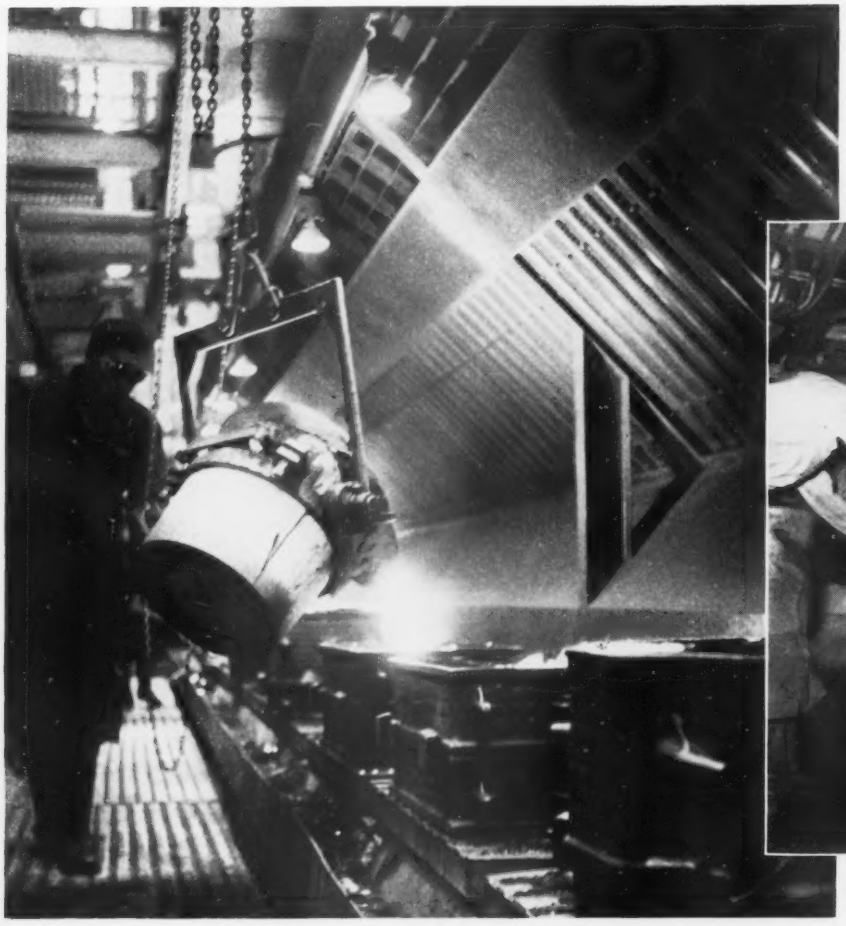
Cable Address: CBSCO

European Licensee: Elex S. A., Zurich, Switzerland

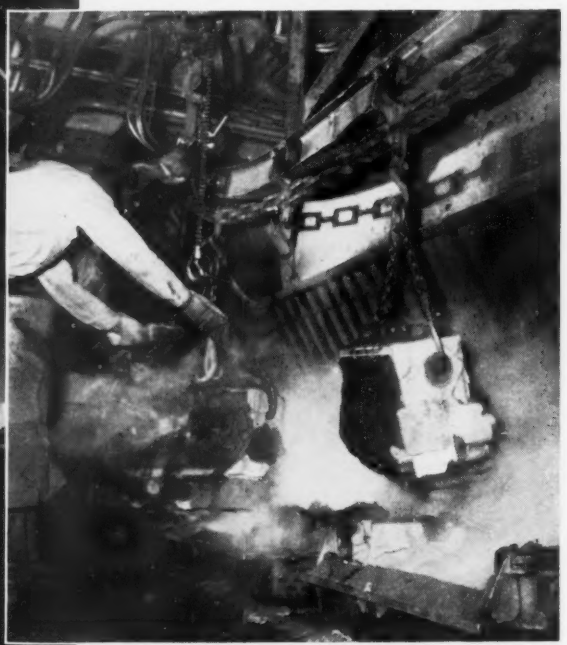
"PATENTS"

"All Schneible Equipment is covered by patents in United States and foreign countries. Infringements will be prosecuted."

SCHNEIBLE



Schneible Uni-flo Compensating Air Hoods in operation on cylinder block line in a large Eastern automotive foundry



Late News

PEARLITIC SPURT: Production of pearlitic malleable iron castings this year will approach 170,000 tons, about double the 1954 output. This is indicated by a survey made recently by the Malleable Founders' Society. The tonnage includes that of member companies only, believed to represent 90 to 95 per cent of the U. S. total. The society also expects total malleable production in 1955 to be the second highest in history, with some possibility seen of matching the present peak of 1,080,000 tons reached in 1951.

MAGNESIUM UP: Prices of primary magnesium pig and ingot have been increased 4 cents a pound by the Dow Chemical Co., effective Aug. 16. This raises pig to 32.50 and notched ingot to 33.25. f.o.b. Freeport, Tex. Last price change in magnesium was a 1½-cent advance in March.

TOOL EXPANSION: Acme Aluminum Alloys Inc., Dayton, O., has started a half-million dollar expansion program for the increased production of tools, dies and special machinery. At one time a large producer of aluminum castings, Acme discontinued foundry operations. Its former main foundry building, containing 200,000 sq ft of floor space, will house all future machining operations.

FIRMS JOIN: Alexander Fleck Ltd., Ottawa, Canada, has acquired stock holdings in Beach Foundry Ltd., same city. The two firms will combine their operations at the latter's plant. Fleck builds specialized pulp and paper making equipment. Beach Foundry, a manufacturer of ranges, domestic heating and air conditioning equipment, operates a gray iron foundry.

HOPES TO SELL: Plans to lease the big government-owned steel foundry and machine shop at New Castle, Pa. have been called off by the General Services Administration. Instead, the agency will make another attempt to sell the property, which until a short time ago had been operated under lease by United Engineering & Foundry Co. Built during World War II at a cost of about $23 million, the plant failed to attract a buyer when offered by the GSA at $14½ million. Public sale will be scheduled after the plant has been revalued by private appraisers.

ASK TARIFF HIKE: Increase in soil pipe imports from 219 tons in 1949 to 5729 tons in 1954, and a further step-up indicated in 1955, has caused the Cast Iron Soil Pipe Institute to request a raise in tariff by invoking the "escape clause" of the General Agreement on Tariffs and Trade. The institute states that foreign soil pipe manufacturers are favored by cheap labor, costing about one-third that in this country, and by low-cost water transportation to U. S. markets.

INVESTMENT CASTINGS: Producers of investment castings expect 1955 sales to reach $125 million, about 60 per cent more than in 1954. These figures are based on a survey just completed by the Investment Casting Institute, Chicago. Last year's sales averaged $957,953 per reporting company. Accelerated procurement of jet engine components is a big factor in the current sales rise.

OBITUARY: Herbert J. French, 62, well known metallurgist and vice president, International Nickel Co. Inc., died Aug. 17 . . . Andrew Hoffman, 95, chairman, Hansell-Elcock Co., Chicago, died Aug. 12.

PERSONALS: Claude A. Marlowe, since 1949 sales manager, Pittsburgh Metals Purifying Co., Pittsburgh, has been elected executive vice president . . . William M. Taylor has been appointed assistant general manager, Lacledé-Christy Division of H. K. Porter Co. Inc., St. Louis . . . C. A. Ahlstrom has been named district manager in the Philadelphia area for the Bay State Abrasive Products Co. . . . Herbert E. Eggerts has been placed in charge of foundry operations for Kingwell Bros. Ltd., San Francisco. Recently he was managing partner of Berkeley Brass Foundry Co., Berkeley, Calif. . . . Jack Cole has been elected a vice

president of Wysong & Miles Foundry Inc., Greensboro, N. C.

BUYS FOUNDRY: Perfect Circle Corp., Hagerstown, Ind., has bought the gray iron foundry of Dill Inc., Rushville, Ind. The foundry, shut down for several years, is expected to be reopened during September. Perfect Circle also operates foundries in New Castle and Richmond, Ind., and Muskegon, Mich.

MORE COKE: International Harvester Co.'s Wisconsin Steel Works has ordered 52 by-product coke ovens from Wilputte Coke Oven Division, Allied Chemical & Dye Corp. They will replace 45 outmoded units at South Chicago, Ill. Interlake Iron Corp. expects to complete by next summer at South Chicago a battery of 50 new ovens. They will replace a battery built in 1912.

SMALL BUSINESS AIDS: Small Business Administration has grouped 31 of its printed management aids into a single volume. Subject matter falls into three groups: Business-government relations, internal management, and external sources of help, advice and guidance. Copies of this first annual are available from Superintendent of Documents, Washington 25, for 65 cents.

MISCELLANY: July production of 132,670 tons of primary aluminum set a new monthly record and brought the year's seven-month total 6 per cent ahead of last year . . . A. O. Smith Corp. suffered a $1 million loss Aug. 10 when fire destroyed a pattern and parts storage building at its Los Angeles plant . . . G & W Electric Specialty Co., Chicago, plans to build a $1 million plant near Blue Island, Ill. It will include a 20,000-sq-ft brass and aluminum foundry for its affiliate, Manufacturers Brass Foundry Co., Chicago . . . W. W. Sly Mfg. Co., Cleveland, has opened a new branch office at 4645 E. Olympic Blvd., Los Angeles . . . Exports of iron and steel scrap the first half of this year totaled 2,595,140 tons, 63 per cent more than in all of 1954 . . . Gray Iron Founders' Society expects 1955 shipments of gray iron castings to equal or possibly exceed the 13.7 million tons shipped in 1953, the industry's second best year.

Prices of Foundry Metals and Coke

(As of August 26, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.00-17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	25.75
Detroit	26.25
Erie, Pa.	25.00
Indianapolis	25.50
Kearny, N. J.	25.50
Lone Star, Tex.	18.50
Milwaukee	26.25
Montreal, Que.	27.25
New England, deld.	27.05
Painesville, O.	26.25
Philadelphia	25.00
St. Louis, del.	26.00
St. Paul	25.00
Swedeland, Pa.	25.00
Terre Haute, Ind.	25.50

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$61.00	$61.50
Birmingham	55.00	....
Buffalo	59.00	59.50
Chicago	59.00	59.00
Cleveland	59.00	59.00
Duluth	59.00	59.00
Erie, Pa.	59.00	59.00
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	59.00	....
Granite City, Ill.	60.90	61.40
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	59.00	59.00
Steelton, Pa.	61.00	61.50
Swedeland, Pa.	61.00	61.50
Toledo, O.	59.00	59.00
Troy, N. Y.	61.00	61.50
Youngstown, O.	....	59.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 39.75; tin bronze, No. 225, 55.50; No. 245, 47.75; high-leaded tin bronze, No. 305, 43.00; No. 1 yellow, No. 405, 32.75; manganese bronze, No. 421, 36.75.

ALUMINUM: 99 per cent plus primary ingots 24.40. Secondary No. 12 alloy 30.00-30.75. Deoxidizing grades: No. 1 30.75; No. 4 28.25.

MAGNESIUM: 99.8 per cent notched ingots 33.25, f.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 40.00 delivered Connecticut valley.

ZINC: High grade 13.85, delivered. Die casting alloy No. 3 16.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$32.00-33.00	**$46.00-47.00	.....	.....	.....	.....	$44.00-51.00
Boston*	**36.00-37.00	**30.00-31.00	.....	.....	**35.00-36.00	.....	.....
Buffalo	39.00-40.00	**40.00-41.00	.....	.....	**43.00-44.00	.....	51.00-52.00
Chicago	41.00-43.00	46.00-47.00	.....	50.00-51.00	50.00-51.00	51.00-52.00	56.00-58.00
Cincinnati*	**41.50-42.50	**45.00-46.00	**38.00-39.00	.....	**49.00-50.00	.....	**52.00-53.00
Cleveland	43.50-44.50	47.00-48.00	37.00-38.00	48.00-49.00	48.00-49.00	51.00-52.00	54.00-56.00
Detroit*	**39.00	**39.00	**32.00	**32.00	.....	**35.00	.....
Los Angeles	32.00	**43.00-45.00	.....	.....	.....	.....	.....
New York*	40.00-41.00	40.00-41.00	37.00-38.00	.....	.....	.....	.....
Philadelphia	46.00-47.00	36.00-38.50	45.00	.....	47.00	50.00	.....
Pittsburgh	44.00-45.00	40.00-41.00	35.00-36.00	.....	44.00-45.00	.....	53.00-55.00
St. Louis*	36.50	43.00	35.00	46.00	.....	.....	52.00
San Francisco	32.00	45.00	36.00	39.00	48.00	.....	.....
Seattle	33.00	38.00	30.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Whitehead's
FINE SILICA SANDS
for Fine Finish Castings and Shell Molding

Whitehead offers the widest variety of fine washed and unwashed silica sands . . . all laboratory-tested in a Whitehead laboratory in each of the areas represented.

DIVIDING CREEK, New Jersey
Fine Washed Silica Sands

Retained on Sieve #	Grade D #71	Grade D Special #75	Grade E #96	Grade Overflow #118	Grade Superior #158
30	none	none	none	none	none
40	2.0	1.0	1.0	.2	.2
50	9.8	4.8	7.6	3.2	1.8
70	26.4	14.0	20.4	13.2	4.6
100	41.0	40.2	31.8	29.0	11.2
140	15.0	29.8	17.2	20.2	22.4
200	4.4	8.2	10.8	15.4	25.6
270	.8	1.2	5.6	8.8	14.0
Pan	.6	.8	5.6	10.0	20.2

McCONNELLSVILLE, New York
Fine Unwashed Silica Sands

Retained on Sieve #	#103	#130	#155	#180	#230	#275
30	.3	.2	none	none	none	none
40	.5	.2	.4	"	"	"
50	4.2	.4	1.4	"	.2	"
70	13.6	1.6	3.2	.4	.2	.2
100	26.1	12.4	10.2	2.5	.4	.6
140	25.7	32.8	22.0	18.0	4.0	1.2
200	20.8	37.2	30.0	35.9	21.4	6.4
270	5.5	9.8	14.2	17.4	21.4	11.2
Pan	3.3	5.4	16.8	23.8	46.4	80.4
Very Fine	none	none	1.8	2.0	6.0	

NEW ENGLAND
Marion Fine Washed Silica Sand AFSF #105

Sieve #	Retained
+6	none
12	"
20	"
30	"
40	.6
50	1.4
70	6.0
100	30.6
140	34.4
200	19.2
270	4.6
Pan	3.2

LEADER IN FOUNDRY SANDS SINCE 1841

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

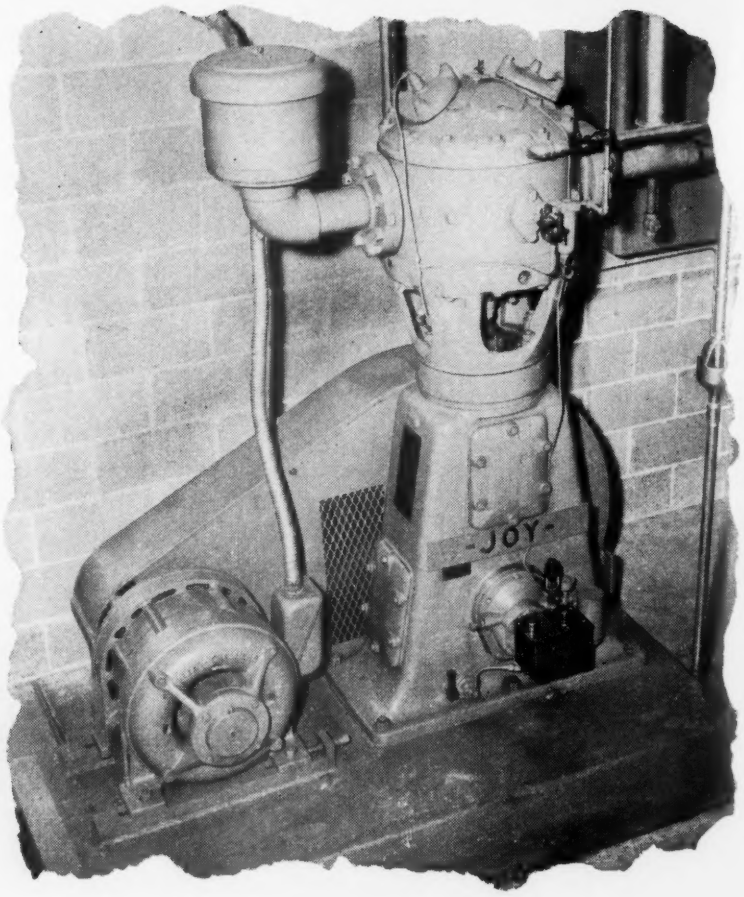
LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

YOU GET BIG COMPRESSOR ADVANTAGES...

UNEQUALLED DURABILITY!

TRULY CONTINUOUS SERVICE!



...in this SMALL HEAVY DUTY JOY WG-9

The Joy WG-9 was designed to give a moderate (up to 881 CFM) but *continuous* air supply. It is suited for use both as a main air supply for smaller requirements, and as an auxiliary, or decentralized, air source in larger plants.

Heavy duty service is assured through these many "big compressor" advantages, including exclusive features not found in any other units available for comparable service:

- Water cooled for continuous operation, greatest efficiency.
- *Exclusive* . . . replaceable-on-the-job cylinder liners for easy maintenance.
- Heavy duty, ball-type main bearings which need no adjustment.
- *Exclusive* . . . field-replaceable crosshead guide of special alloy, honed to mirror finish.
- Patented "Dual Cushion" valves for efficient, lasting life and quiet action.
- Full force-feed lubrication to all working parts.
- Rugged construction throughout for long life, low maintenance.
- Single-stage, double-acting . . . vertical design for greater economy of floor space.

Joy WG-9 Heavy Duty Compressors are available in fifteen different capacities and with a wide range of pressures from 30 lbs. up. Write for bulletins on standard, booster or oil-free models, to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

W&D 1-5504

Consult a Joy Engineer

FOR VANEAXIAL FANS • COMPRESSORS
VACUUM PUMPS AND BOOSTERS • OXYGEN GENERATORS

JOY

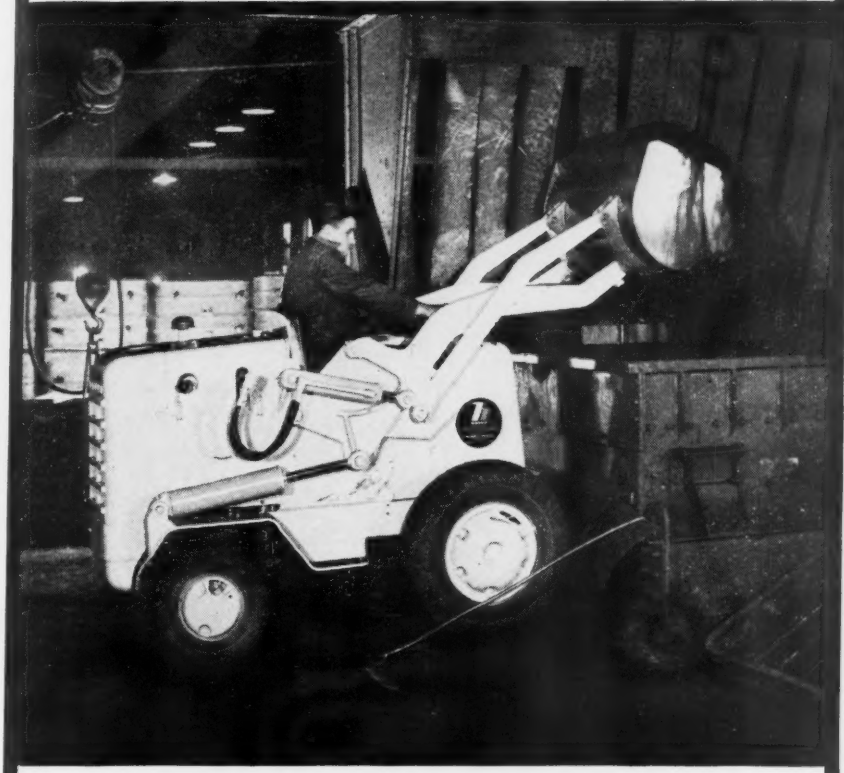
SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

A completely new and different

PAYLOADER®

TRACTOR SHOVEL

NEW MODEL HA



An efficient, more flexible bulk-material handling system

The first Model HA "PAYLOADER" tractor-shovel appeared 15 years ago, giving industry a new, flexible bulk-material handling system. Today, Model HA's are *the* bulk-handling system in thousands of plants.

Now comes the 1955 Model HA — a completely new design — with twice the digging power, lifting capacity and carrying capacity and 50 to 100% greater production capacity.

Whether or not you have older HA's — you should find out how this new HA can reduce your bulk material handling costs. Your "PAYLOADER" Distributor is ready to show you.

Outstanding features:

16⅔% more bucket capacity:
PAYLOAD capacity ..... 18 cu. ft.
Struck-load capacity ..... 14 cu. ft.

Powerful "break-out" digging action Upward rotation of the bucket combines with forward motion of machine in a powerful slicing action that gets full loads quickly, even from lumpy, sticky or heavy materials.

Bucket tip-back of 40 degrees when only 6 inches off the ground carries heaped loads *low* and *close* for maximum stability, balance and safety.

New standards of safety Boom arms and parts are mounted *low* and carry loads *low* and are always clear of the operator. Operator visibility is good at all times.

Advance-design hydraulic system includes: sealed, pressurized hydraulic tank — no breathing of dirt and grit into hydraulic fluid; hydraulic accumulator prevents pressure shocks — gives easier, safer control.

Torque-converter drive and full-reversing transmission with two speed ranges insures fast moves in either direction — easier operation and control — more production.

GAS OR DIESEL POWER OPTIONAL.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

- ☐ Send me complete model HA information
- ☐ Send information on all seven "PAYLOADER" sizes
- ☐ Send name of my "PAYLOADER" Distributor

Name .....

Title .....

Company .....

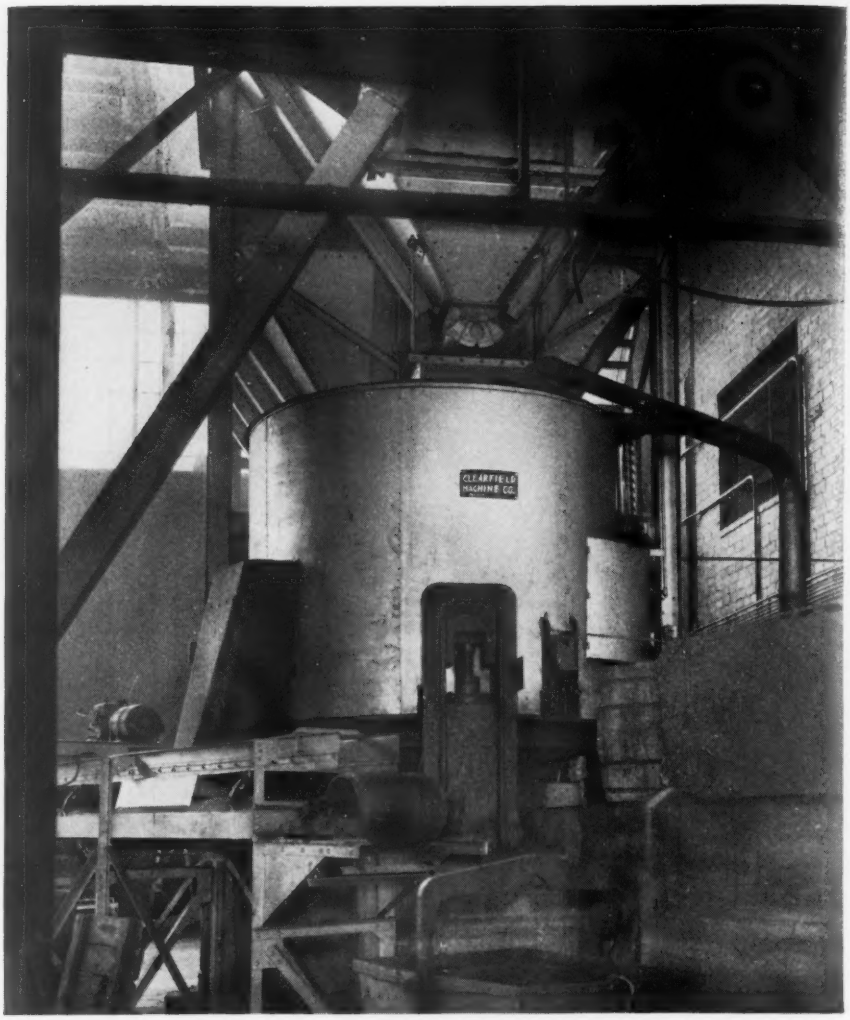
Street or Box No. .....

City ..... State .....

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. • LIBERTYVILLE, ILL.
SUBSIDIARY INTERNATIONAL HARVESTER COMPANY

silica grains, bond and moisture are *Perfectly Blended* with a



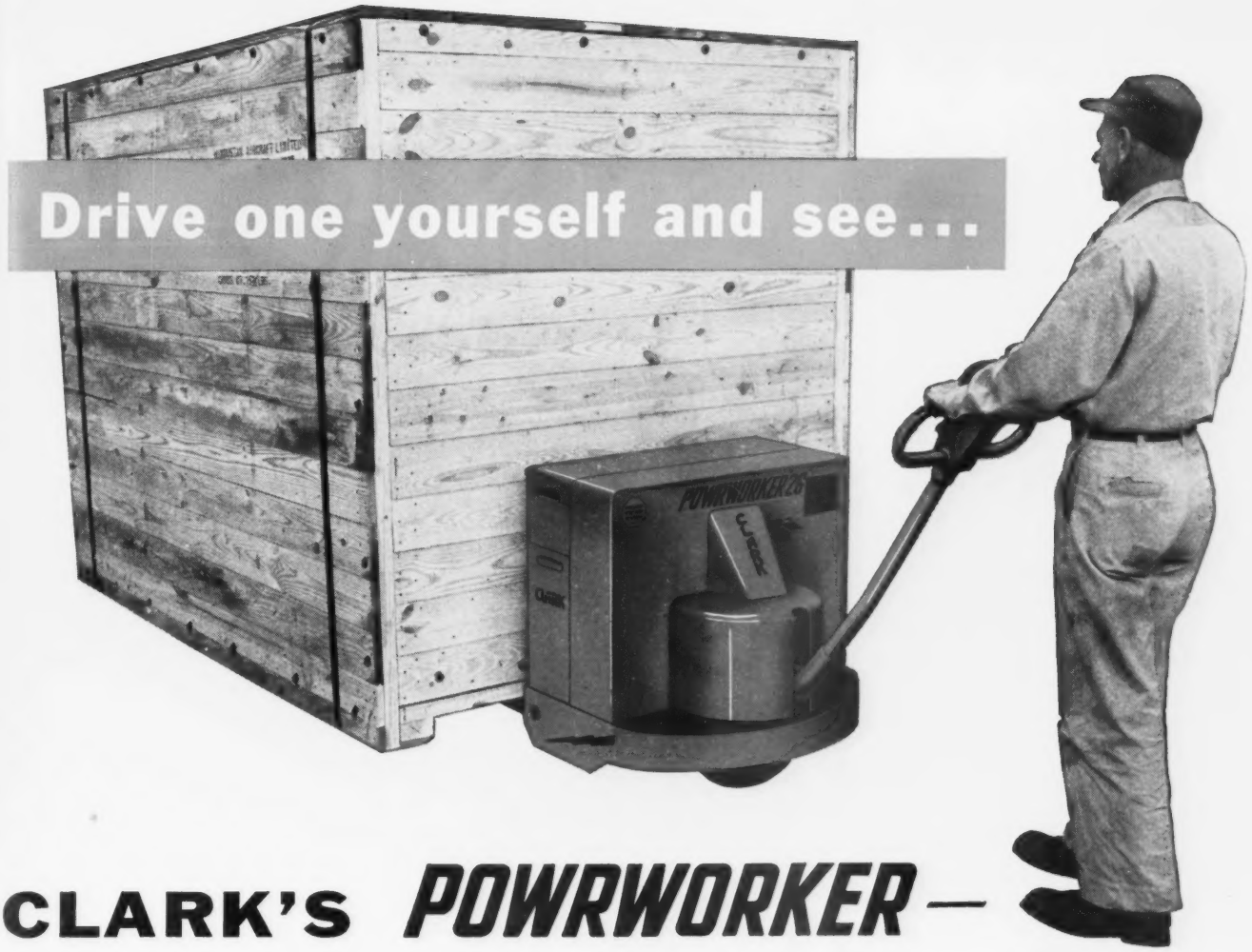
CLEARFIELD MIXER

Sand quality depends on how well three elements are blended. Silica grains, bond and moisture make up the major part in preparing quality sand. The performance of Clearfield Mixers is based on preparing better foundry sand.

Employing the revolving pan principle with vertically rotating mullers, Clearfield Mixers transform the sand from an inert mass into a fluid moving stream by the stirring action of the agitator and centrifugal force. This results in a perfect blending of the three elements . . . thereby producing a better foundry sand.

Write today for Catalog No. 83. See why there is a Clearfield Mixer for every requirement.

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.



CLARK'S *POWRWORKER*—

MANEUVERABLE! POWERFUL! ACCESSIBLE!

Best way to see the outstanding performance features of a Powrworker is to see a demonstration in your own plant. Take it down your tightest aisles, up your steepest ramps, load it to capacity and see for yourself—point for point the Powrworker will outperform any competitive machine on the market. There's no obligation. All you need do is call your local Clark dealer and ask for a demonstration—he'll be happy to help you. You'll find him listed in the Yellow Pages under "Trucks, Industrial."

NEW POWRWORKER BOOKLET...

Send for Clark's new 6-color, 16 page Powrworker Booklet. Full details, cut-away views, bonus features, the entire story on the New Powrworker. It's free . . . just drop us a line and we'll rush your copy by return mail.

CLARK® EQUIPMENT

POWRWORKER SECTION, INDUSTRIAL TRUCK DIVISION
CLARK EQUIPMENT COMPANY, Battle Creek 16, Michigan

SEE FOR YOURSELF...Ask for a demonstration

Quantity and Quality are *Guaranteed* when you specify Neville Foundry Coke

As a merchant producer of Neville Foundry Coke, Pittsburgh Coke & Chemical now has four batteries of ovens to serve you. That's your guarantee of reliable, continuing supplies when you specify Neville.

What's more, we guarantee the *quality* of our coke, too. For Neville Foundry Coke is made from clean, washed coals containing a high percentage of Pocahontas and carefully processed to produce stronger, denser, more uniform coke with more fixed carbon and less ash and sulphur. As a result, Neville Foundry Coke provides maximum temperature at the nose of the tuyere to give you hotter, cleaner, more fluid iron.

Let us fill *your* requirements today—with *guaranteed* Neville Foundry Coke, sized to your specifications.

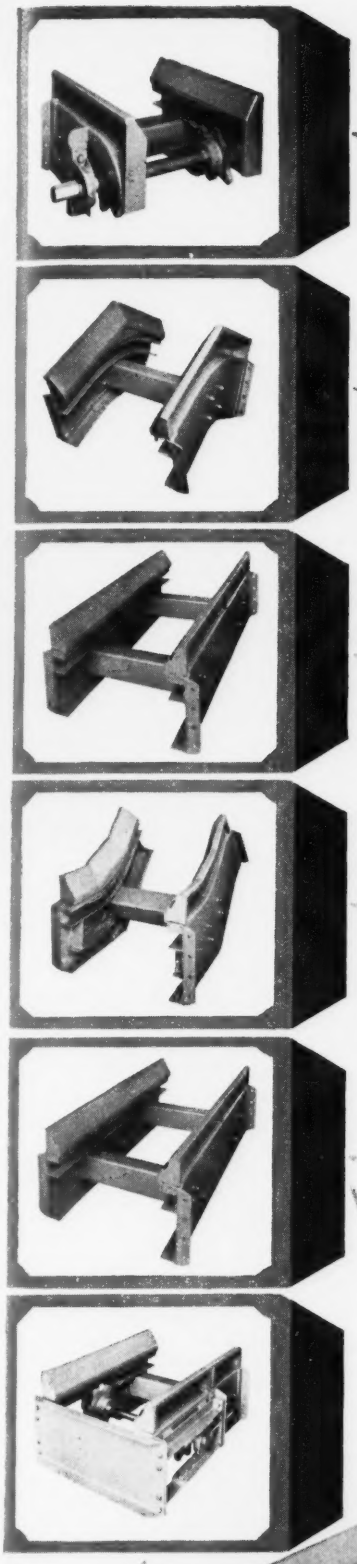
Specifications of Neville Foundry Coke

Volatile Matter	Fixed Carbon	Ash	Sulphur
.75%	92.5%	6.50%	.58%

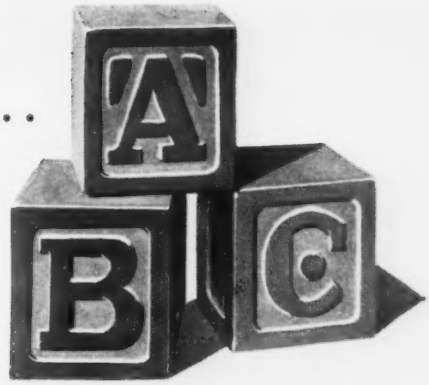
Standard ASTM Shatter on 2" screen is 95%. Porosity controlled at 48%.

W&D-5543

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON



as basic as . . .



Now you can buy CUSTOMIZED conveyors in pre-fabricated STANDARD sections

Designed, developed and constructed for maximum versatility, MAY-FRAN conveyor components now provide users with the ultimate of flexibility. Pre-fabricated conveyor sections can be furnished rapidly and inexpensively. Sections can be assembled to form virtually any type of hinged-steel belt conveyor for handling stampings, formed metal parts, forgings, automotive scrap, chips and turnings and many other miscellaneous products.

Straight sections . . . concave or convex curved sections . . . take-up charge sections and discharge-end sections can be furnished to meet specific requirements of belt width as well as load bearing and volume capacities.

Once installed, a MAY-FRAN conveyor can be dis-assembled and re-assembled in another plant location . . . quickly, easily and with minimum down-time. In addition, conveyors can be lengthened, shortened or modified in almost any way at minimum cost.

MAY-FRAN . . . a name long recognized in the materials handling field . . . is first again with *standardized* components for your *customized* installation.

Write today for complete information.

6279-MF

MAY-FRAN

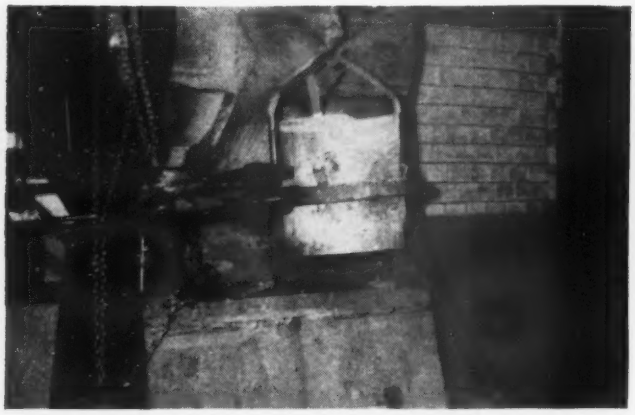
ENGINEERING, INC.

1692 Clarkstone Road • Cleveland 12, Ohio

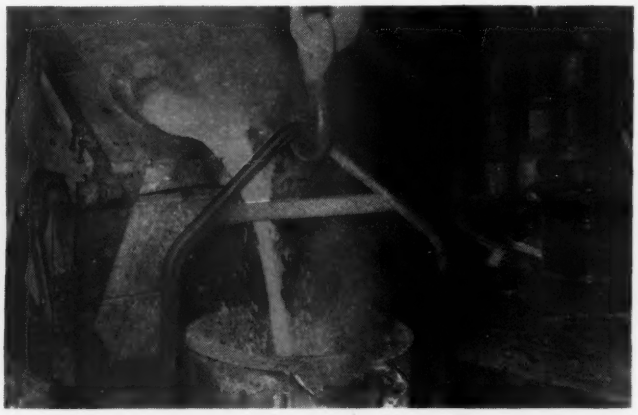
For Pit, Crucible and Reverberatory Furnace Linings the Rx is Norton CRYSTOLON* silicon carbide refractory cement. CRYSTOLON material stands temperatures up to 3050°F without softening, spalling or cracking, and its extreme density assures great resistance to slag attack. Another application for CRYSTOLON cement is as lining material in the slag troughs of front slagging cupolas.

Rx for more melts-per-lining

Norton refractory cements are engineered and prescribed for longer, lower cost service across the range of furnace applications



For Lining Low Frequency Induction Furnaces. Many foundries melting nonferrous metals and malleable iron report that Norton ALUNDUM* fused alumina refractory cement provides extra long life. This high-melting, long-lasting cement is also prescribed for use in holding ladles, desulphurizing ladles and heat treating and sintering furnaces.



For High-Frequency Induction Furnaces, Norton MAGNORITE* fused magnesia refractory cement is expertly engineered to provide the maximum number of heats per lining. It withstands temperatures up to 3250°F, its high-rammed density resists metal penetration, erosion and chemical attack, and it is free from shrinkage cracks that often cause furnace failure.

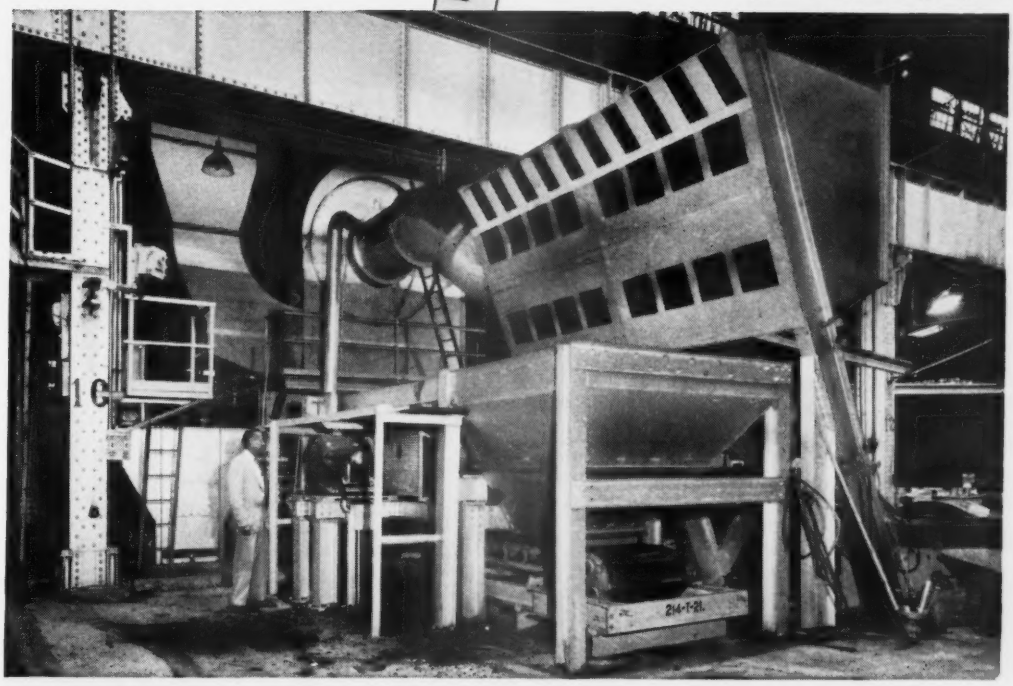
The right Rx for you

Working with ALUNDUM, CRYSTOLON, MAGNORITE and Fused Stabilized Zirconia materials, Norton technicians will help you find the exact Rx's — *engineered and prescribed* refractories — you need for more efficient furnace operations. For details, see your Norton Refractories Engineer, or write to NORTON COMPANY, Refractories Division, 308 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON
REFRACTORIES
Engineered... Rx... Prescribed
Making better products... to make your products better

More CFM Per Sq. Ft. of Space!



THERE'S ALWAYS ROOM FOR A ROTO-CLONE. Believe it or not, this compact AAF Type W ROTO-CLONE is exhausting 50,000 *cfm* from this shakeout at General Steel Casting Corporation's Granite City, Ill. plant.

Type W ROTO-CLONE Exhausts 50,000 cfm In General Steel Castings Shakeout Operation

TO look at it, you'd hardly believe that this dust collector is capable of exhausting 50,000 cubic feet per minute from this shakeout. But here, as is the case with all space-saving AAF ROTO-CLONES, looks are deceiving.

In the installation pictured above, at General Steel Casting Corporation's Granite City, Illinois plant, the Type W ROTO-CLONE exhausts the dust through a hood which runs the full length of the shakeout. Collected material goes into a settling tank equipped with drag-type sludge ejector for automatic de-watering and removal of sludge. The clean, affluent water overflows to the sewer.

High efficiency, minimum space, constant exhaust volume and maintained performance —these are the features of all AAF Dust Control Equipment. And these are the reasons for General Steel Castings' consistent use of ROTO-CLONES over the years.

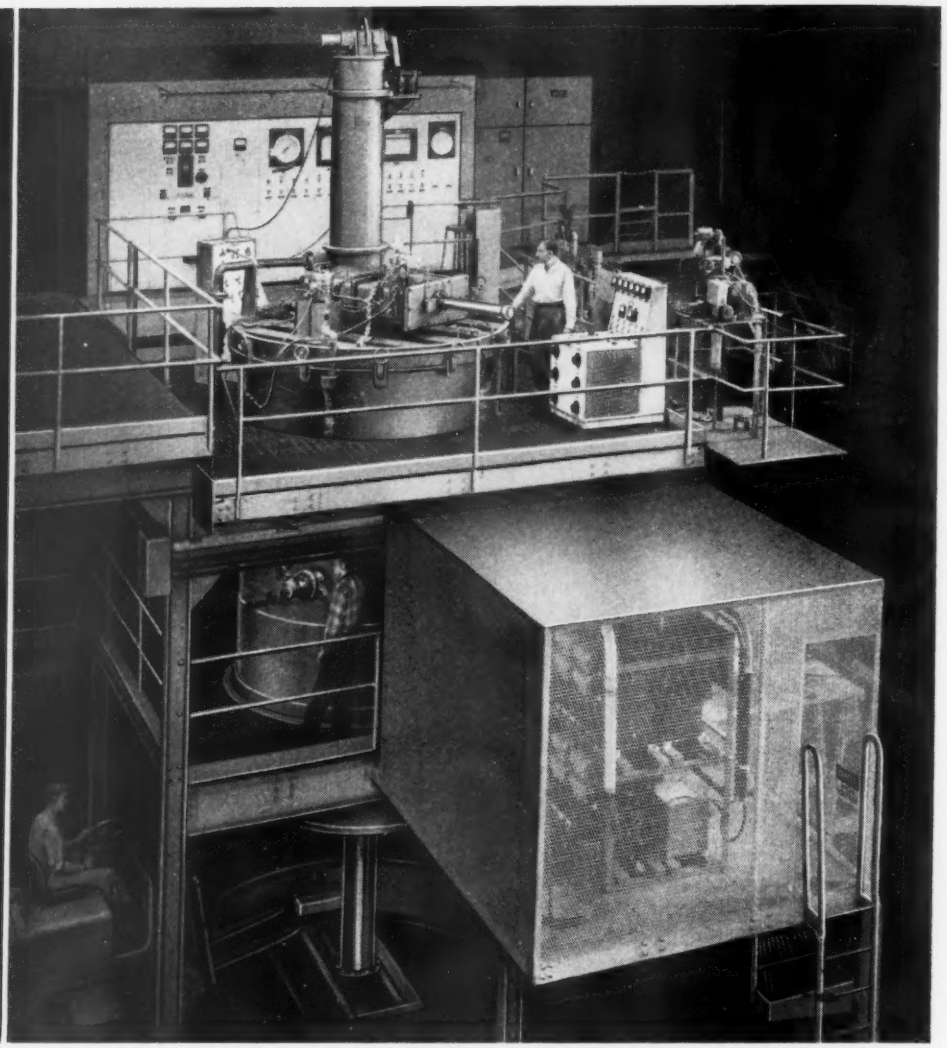
For complete information about AAF Dust Control Equipment and practical assistance with *your* dust problems, call your local AAF representative or write direct to—

AAF herman nelson

American Air Filter
COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 266 Central Avenue, Louisville 8, Kentucky

what made vacuum melting work?

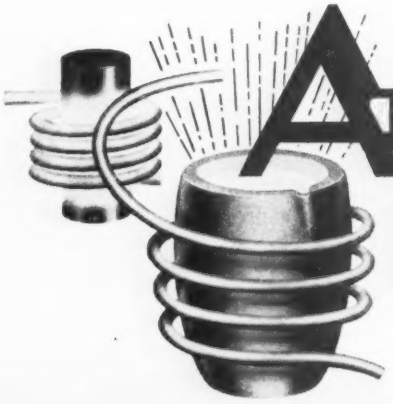


The first 1000-lb. vacuum furnace to be put into production. Photo courtesy Universal-Cyclops Steel Corp., Bridgeville, Pa.

primarily—newly discovered vacuum techniques applied to forty years of induction furnace manufacturing experience. And only at Ajax does this experience cover so many melting developments over such a long period of time. Successful vacuum melting, as it comes from Ajax today, is just another refinement in Ajax quality melting at production speed.

The vacuum furnace illustrated above is typical of a number which are now being built for purer, stronger alloys in capacities from 5 to 2000 lbs. For details, write Ajax Electrothermic Corp., Trenton 5, New Jersey.

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.



AJAX NORTHRUP *SINCE 1916*

INDUCTION HEATING-MELTING

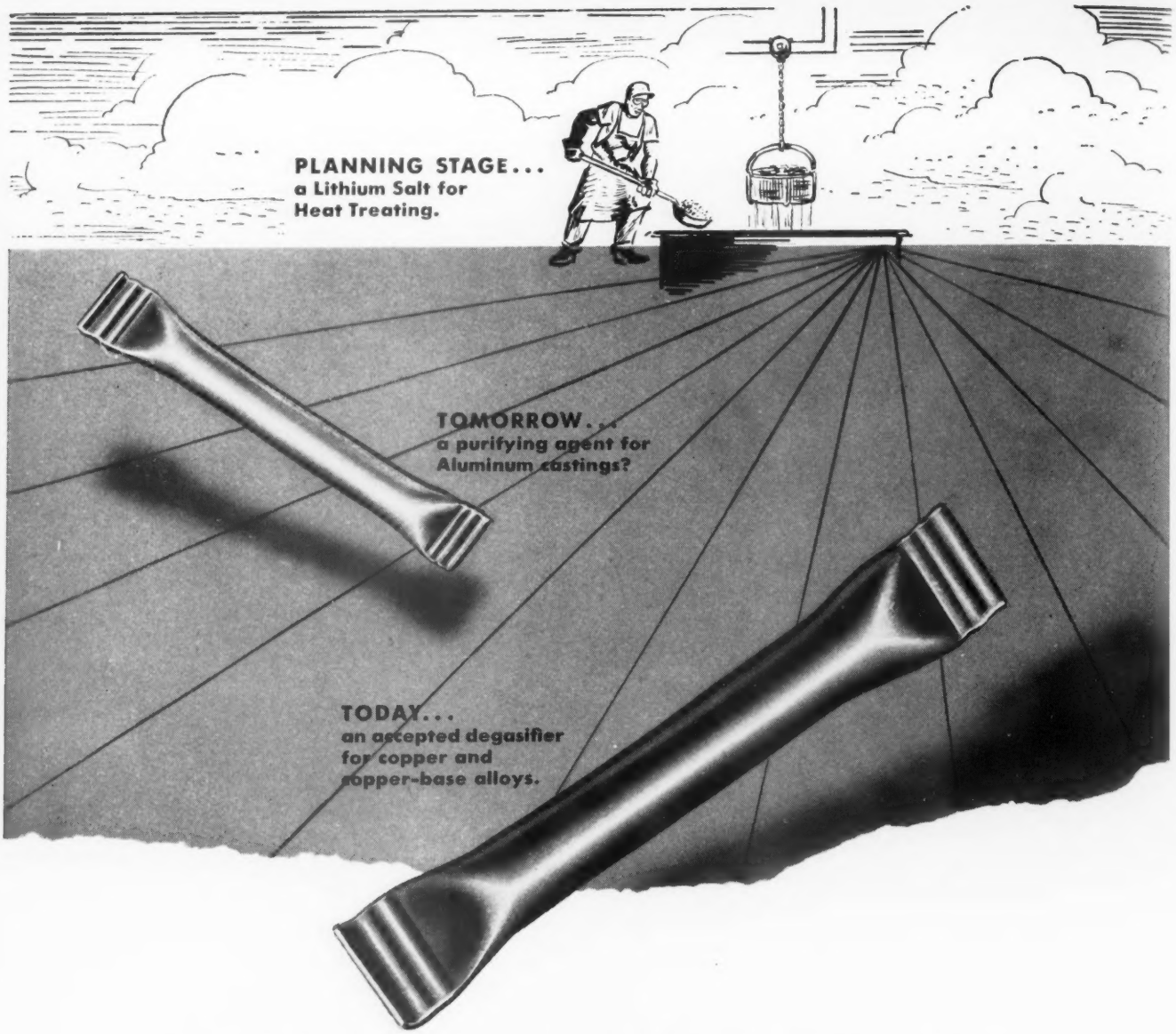
Plenco research produces better resins for

better shell molding...

When shell molding was introduced to this country in 1947, Plastics Engineering Company was quick to realize the great potential of this new process. A laboratory was equipped to manufacture shell molds, special machinery was designed and fabricated and an intense research program was launched. The results of this research and the experience gained is available to you at your request.
Write or call and one of Plenco's engineers will give you whatever technical advice and assistance is necessary to help you solve any plastics problem you might have.

PLASTICS ENGINEERING COMPANY
Sheboygan, Wisconsin

PLENCO PHENOLICS
FOR BETTER PLASTIC PRODUCTS



LITHIUM METALLURGY

Lithium has been long established in the nonferrous foundry industry as a degasifier, deoxidizer, desulfurizer and general purifying agent. The small amounts required put both the economics and technique within the limits of everyday nonferrous foundry operation. Now, tests under certain production conditions indicate that Lithium is equally valuable as a degasifier for aluminum castings. Still in the realm of research, Lithium Salts hold vast promise of valuable benefits for low temperature heat treating baths. Why don't you look into this miracle element? This revolutionary technique is within *your* reach. Write for the details.

...trends ahead in industrial applications for Lithium

LCA **LITHIUM CORPORATION OF AMERICA, INC.**
2600 RAND TOWER
MINNEAPOLIS 2, MINN.

MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, North Carolina • Cat Lake, Manitoba • Amos Area, Quebec • BRANCH SALES OFFICES: New York • Chicago
CHEMICAL PLANTS: St. Louis Park, Minnesota • Bessemer City, North Carolina • RESEARCH LABORATORY: St. Louis Park, Minnesota

HYSTER®

PLANNED MATERIALS HANDLING SAVES TIME AND MONEY in foundries

Here are typical examples of how Hyster Industrial Trucks are helping to make *tremendous* savings in materials handling costs in *foundries.*

Whether you are now using lift trucks, or haven't ever used industrial trucks of any kind, your Hyster Dealer is ready to help you achieve cost reductions. Because he keeps abreast of the materials handling problems and improvements, he has helped many foundries realize more profit from their operations. *Why not call him today* and take advantage *of his specialized services? Materials Handling Trucks from 1,000 to 30,000 pound capacities.*

HYSTER YT-40 operates over rough and muddy ground. No other lift truck in the 4,000 lb. class was found by this foundry to stand up in this service.

HYSTER DEALERS GIVE YOU ALL 3

1. PLANNING. Your Hyster Dealer will plan your materials handling operation from scratch—or will analyze your present system to see if it can be improved.

2. THE RIGHT TRUCK for *your* job from Hyster's complete line of industrial trucks (1,000-30,000 lbs) and over 100 job-attachments.

3. THE RIGHT SERVICE—ample spare parts stock, shop facilities, factory-trained mechanics and an efficient field service that keep your Hyster lift trucks going on your job, wherever your job might be located. Hyster trucks are noted the world over for their low downtime.

KARRY KRANE® with sling and hook arrangement transports long pipe through narrow driveways.

HYSTER COMPANY

2902-30 N. E. Clackamas.....Portland 8, Oregon
1010-30 Myers Street.....Danville, Illinois
Hyster N.V. .....Nijmegen, The Netherlands

FOUR FACTORIES: Portland, Oregon; Danville, Illinois; Peoria, Illinois; Nijmegen, The Netherlands.

you can get it from

EASTERN CLAY

—materials and equipment for efficient foundry operations

SAND ADDITIVES

Westonite
Triplact
Plasti-Bond
Maplex

SPECIAL BINDERS

Balanced Revivo
Revivo Core Paste
Revivo Dry Bond
Revivo Core Mud

SPECIAL REFRACTORIES

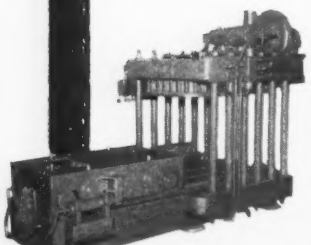
Zircon Brick
HTR Plastic Brick
HTR High Temperature Cement
HTR Castable

FOUNDRY EQUIPMENT

Dura Products

Bondactor Refractory Gun

Taccone Diaform Molding Machine



STANDARD BONDING CLAYS

Black Hills Bentonite
Revivo Bond
Dixie Bond

STANDARD LININGS

Revivo Fire Clay	Cupoline
Lawco Fire Clay	Superline
Bondact Fire Clay	Hyline
Cupoline Plastic	Pitline

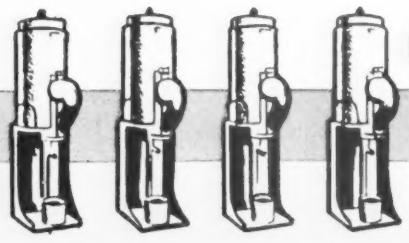
Cupoline Ladle Mix

Many of today's accepted foundry practices such as synthetic sand, southern bentonite, chemical sand additives, cupola "gun patching" and pressure and diaform molding stem from *Eastern Clay's* pioneering, research and developments in materials, equipment and methods.

You can get from *Eastern Clay* this wide variety of materials and equipment plus modern technical know-how on improved operating efficiencies and the production of finer quality castings.

So call your *Eastern Clay* representative. You'll get prompt, understanding and helpful cooperation.

Minerals International Chemicals



ECP laboratory control makes for uniformity

In addition to our own laboratories, four in number, we carry on tests constantly at universities, research institutes and private laboratories. Quality is dependably uniform from car to car.

BENTONITE as you like it!

Black Hills 80. Granular; produced to the lowest possible dust level to eliminate loss at the muller. For maximum efficiency with systems which include fines-removal equipment.

Black Hills Slurry Grade. Coarser than our 80-fineness grade; recommended for rapid dispersion and maximum efficiency in water when clay is added to sand as a slurry.

BLACK HILLS BENTONITE pulverized or 200-mesh. Selected by foundries generally for rapid mulling. Strong, uniform, dependable.

BLACK HILLS BENTONITE

International Minerals & Chemicals

EASTERN CLAY PRODUCTS DEPT.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago, 6

DIXIE BOND • BLACK HILLS BENTONITE • TRIPLACT • REVIVO CORE PASTE • REVIVO BOND • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE

FIND THE CAUSE OF CRACKS

and you'll cut the COST of castings

With the black light of Magnaflux-Magnaglo, you can give a low cost check to each production step to find WHERE and WHY invisible cracks are being "built-in" your castings.

A high percentage of cracked castings doesn't just happen—there's always a reason. It may be in pouring, sprueing, shake-out, cleaning, handling, grinding or heat treating—even shipping.

But which step is at fault? why?

By answering these questions, non-destructive inspection with Magnaflux* can help you SAVE MONEY. By sample checking of the output from each production step, Magnaflux shows where the cracks *first* appear, helps you to find the faulty operation or process and suggests the remedy. Correction often involves only a minor change in production techniques. Result: production runs with almost no cracks.

How much you can save with Magnaflux naturally depends somewhat upon your own operation. In practically every case Magnaflux can help you to turn out better castings *at greater profit per casting.* Ask to have a Magnaflux engineer give you the facts and figures! They're interesting and enlightening! Set the date now!

*Magnaflux is a registered trademark of the Magnaflux Corporation.

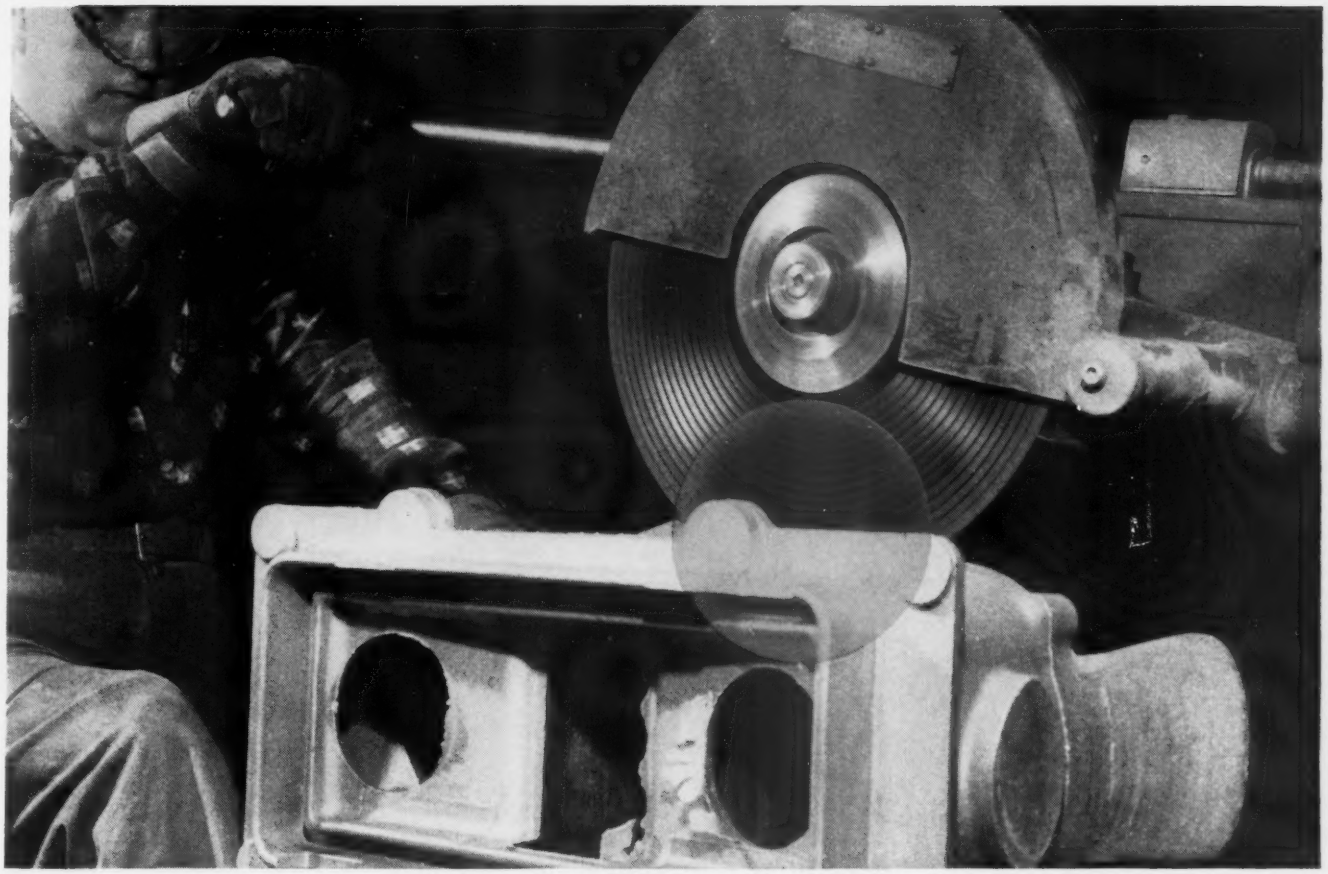
IMPROPER HANDLING CAUSED THIS CRACK

White line on bell-end casting for an electric motor is a Magnaglo indication of a crack. Sampling inspection with Magnaflux showed handling methods were consistently causing this crack. With the cause located, correction was simple — production of sound castings increased.

MAGNAFLUX

MAGNAFLUX CORPORATION
7350 West Lawrence Ave. • Chicago 31, Ill.

New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 19 • Los Angeles 58



CUTTING-OFF IS ONE OF MANY BN APPLICATIONS. This glass cloth-reinforced wheel — one of the safest and longest lasting in industry — is also a cost-cutting "Touch of Gold" performer for snagging, slotting, notching, etc.

You can do—and save—a lot with the BN!

Popular Norton Reinforced Wheel brings the profit-building "TOUCH of GOLD" to many different jobs

Strength, safety and versatility are the reasons why the Norton BN reinforced wheel is one of the foundry industry's most valuable production tools.

This straight wheel is strong and safe because of its resinoid bonded, glass cloth-reinforced structure that assures high resistance to breakage.

You'll find the BN unequalled for cutting-off gates and risers on non-ferrous castings, on both stationary and swing-frame machines. On portable grinders, bench stands and floor stand grinders you can use it for nicking gates and risers and slotting — also, for light snagging and cleaning of both ferrous and non-ferrous castings.

And it will do all these jobs for you with the fast cutting action, low rate of wear and wide margin of safety that add up to money-saving "Touch of Gold" performance.

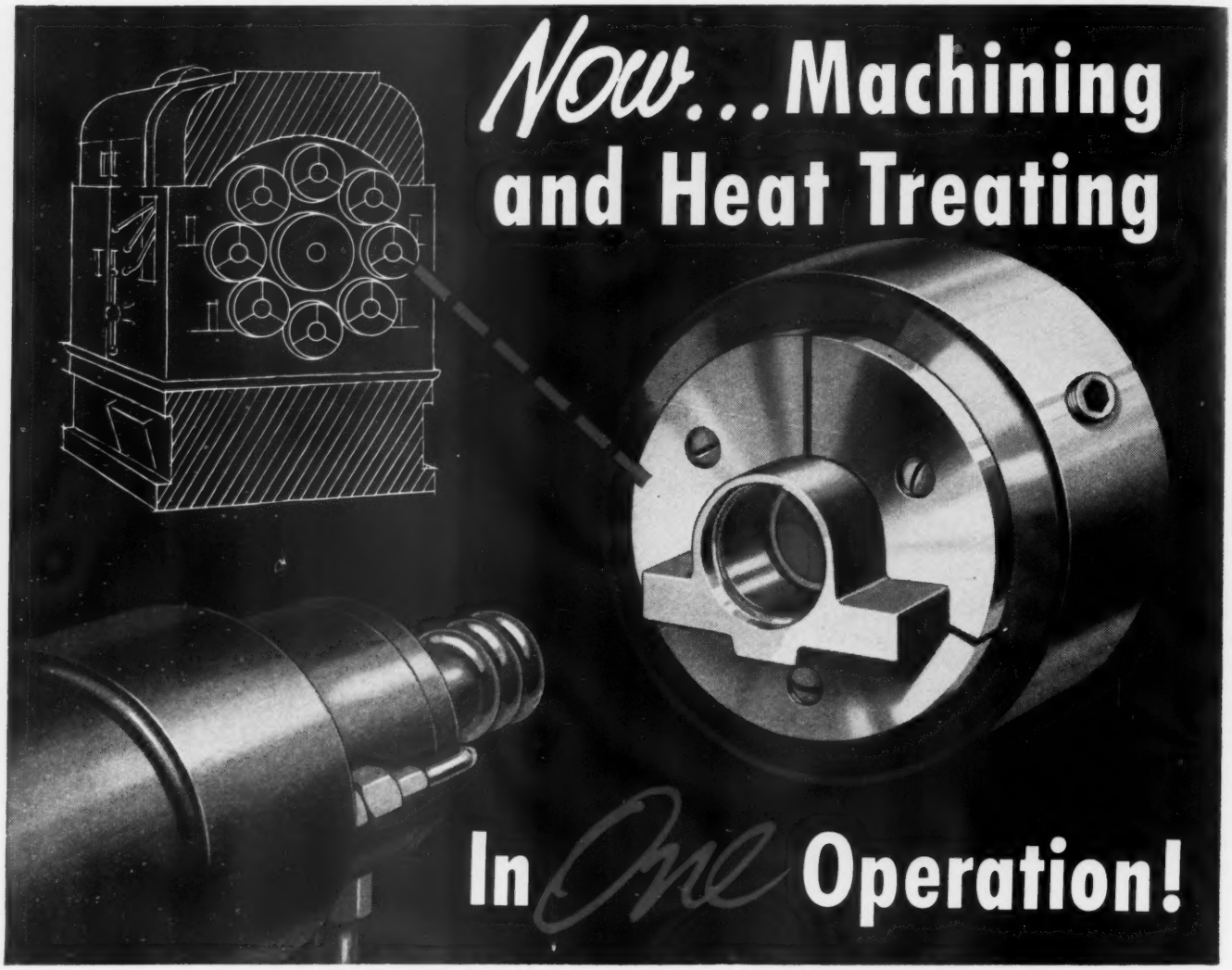
See your Norton Distributor about a demonstration of the BN and other Norton reinforced wheels in your foundry. Ask him for the big new reinforced wheel catalog with net prices. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

W-1656

NORTON *Making better products... to make your products better*

and its BEHR-MANNING division

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes



with TOCCO Induction Heating

Mechanics Universal Joint Division of Borg-Warner Corporation now combines automatic heat-treating and metal-working operations on the same machine!*

A Tocco Inductor Coil, matched to one spindle of a multiple spindle automatic screw machine, heat treats the inside diameter of automotive trunnion cups—after they have been completely formed on the same machine tool. Twenty-two, 20 and 50 kw, 450,000 cycle TOCCOtron Induction Heating units and 44 automatic screw machines (installed here and in other plants) make up this high-speed production team.

This new method permits the use of SAE 1144 steel and eliminates costly, time-consuming copper plating and carburizing operations formerly required. Heating and quenching cycles total approximately 10 seconds per part, and production is in excess of 300 parts per hour from each machine.

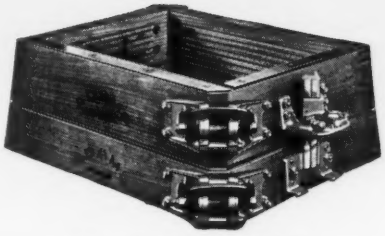
If your products or their components require heat treating, soldering, brazing or forging it will pay you to investigate TOCCO for better, faster ways of producing them at lower unit cost.

Write for free catalog—**TOCCO Induction Heating.**

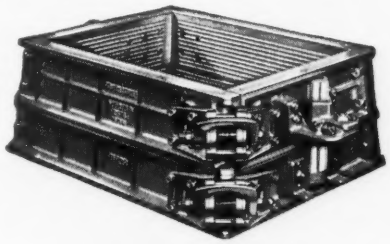
THE OHIO CRANKSHAFT COMPANY
Dept. F-9, Cleveland 1, Ohio

REDUCE YOUR COSTS

ADAMS Cast Iron or Cast Aluminum Jackets



CHERRY EASY-OFF FLASK



ALUMINUM EASY-OFF FLASK

Look at these features and you'll agree that the Adams line can mean economy, efficiency, and better molds for your foundry.

Above is the Adams jacket available in either cast iron or cast aluminum. They are cast from a top grade metal mixture best suited for their purpose. The sturdy construction as a result of the vertical ribs inside and horizontal ribs outside plus the handles at either end assure you of long life for this equipment and ease in handling. These jackets afford you MAXIMUM STRENGTH with MINIMUM WEIGHT.

Here are jackets that assure you perfect mold fit—will give you the greatest strength while under pouring strain—allow for free flow of gases all because of INSIDE CORRUGATIONS. These VENTILATED jackets are first choice in foundries across the nation.

Look into the advantages cast iron or cast aluminum can offer you depending upon your foundry needs. We will be happy to make recommendations to fill your requirements.

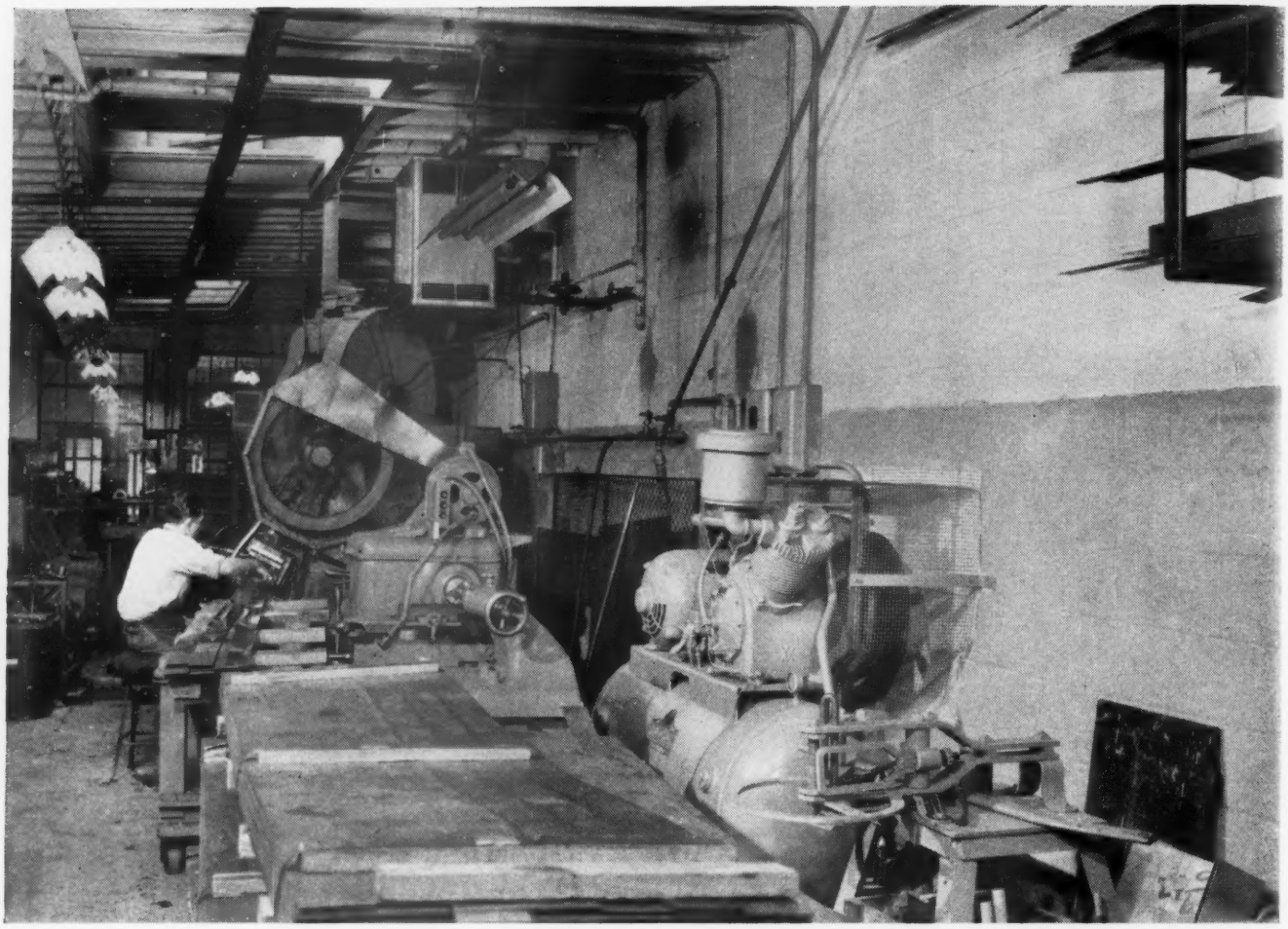
For the most complete line of flask equipment available . . . always look to Adams!

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.



Punching Out Extra Profits

Dependable Westinghouse Air Compressor supplies versatile, economical air power to raise production and lower costs

That's just what the operator of this punch press is doing — punching out the extra profits that result from increased production.

And it's a Westinghouse Air Compressor that's responsible for his greater output.

Why? Because Westinghouse Air Compressors have 15 features not found in any other compressor — features that mean greater dependability and greater efficiency for low-cost operation. Here they are:

Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity fly-wheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

Let compressed air help you punch out those extra profits with its versatility. And guarantee yourself a trouble-free source of supply by using Westinghouse Air Compressors. Sizes up to 40 hp — write for latest literature.

W-102

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

PORTABLE AIR COMPRESSORS

TRACTAIR

STATIONARY AIR COMPRESSORS

AIR TOOLS

ENGINES

ACCO products

WRIGHT Electric Hoists for Top Production, Easiest Maintenance

WRIGHT *Speedway* Electric Hoists—Frame 1, Frame 2 and Frame 3—are ideal **HOISTS** for handling production materials where the load requirements **ARE** from ¼ ton to 10 ton capacity. Their design includes many advanced **SAFE** operating features. Sound choice of components provides them with **EFFICIENT** balance for smooth running. Parts are designed and built to give **RUGGED** performance with a minimum of care. Plant operating men find them **ADAPTABLE** to almost every type of shop work because of the wide range of speeds, lifts and mountings.

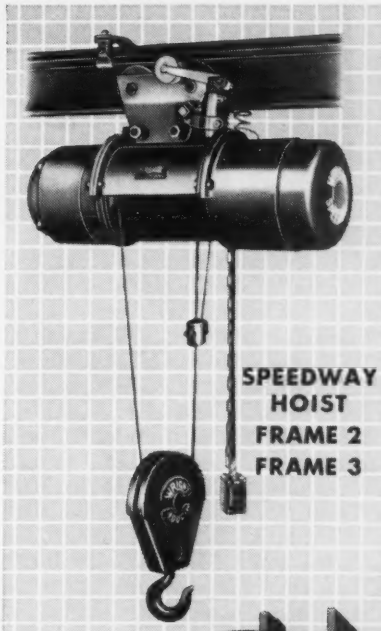
The more particular you are in your selection of hoisting equipment—the more likely you are to choose WRIGHT

Write our York, Pa., office for any or all of these fully informative bulletins—
Bulletin DH-133B on Frame 1 and 1½ WRIGHT Speedways
Catalog E-54A on Frame 2 and 3 WRIGHT Speedways
Bulletin DH-504 on WRIGHT Electric Roller Chain Hoist

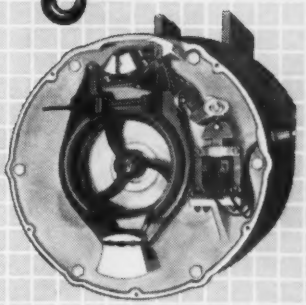
ACCO TRADE MARK

Wright Hoist Division
AMERICAN CHAIN & CABLE
York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

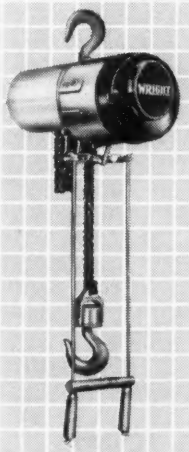
for Better Value



SPEEDWAY HOIST FRAME 2 FRAME 3



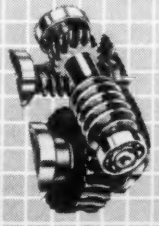
MOTOR BRAKE & SOLENOID FRAME 2 and FRAME 3 HOIST
"Nothing to adjust but the cam!"



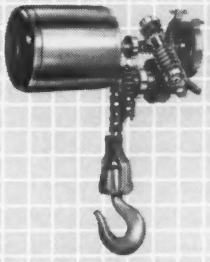
WRIGHT
Electric Roller Chain Hoist

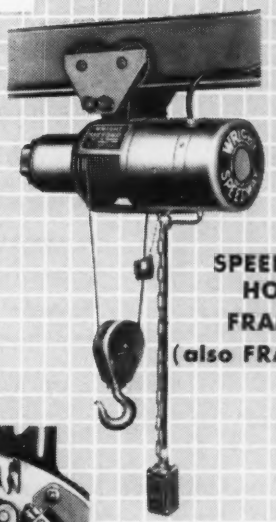
- ¼, ½, 1 and 2-ton capacities
- Fewest number of wearing parts
- Self-locking, double-worm gear acts as own load brake
- Spring-set, shoe-type motor brake, clam shell type
- Oversize precision ball bearings
- Forged steel-alloy hook, swings and swivels

COMPETITIVELY PRICED

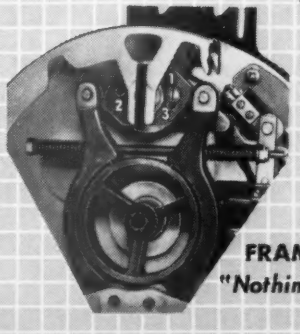


THIS DOUBLE-WORM GEAR ELIMINATES TROUBLESOME LOAD BRAKES





SPEEDWAY HOIST FRAME 1 (also FRAME 1½)



MOTOR BRAKE FRAME 1 and FRAME 1½
"Nothing to adjust but the cam!"

Cut your costs with *Curtis*

AIR COMPRESSORS
AIR HOISTS
AIR CYLINDERS

A plentiful supply

of air to speed production throughout your plant is assured with powerful, precision-built *Curtis* Air Compressors.

- **air-cooled, two stage—¼ to 20 H.P. inclusive**
- **water-cooled, single stage—20 to 50 H.P. inclusive**
- **Timken tapered main bearings permit easy external adjustment**
- **long-life pressure-lubricated connecting rod and piston pin bearings**

Tank-mounted compressors in sizes from ¼ through 15 H.P. inclusive (1 to 78 cu. ft.)—also available in base-mounted type.

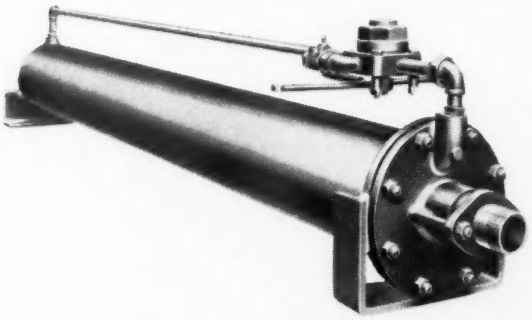
Simple and base-mounted compressors from ¼ through 50 H.P. inclusive (1 to 300 cu. ft.).

LIFT, LOWER, PUSH or PULL

easily, economically and safely with *Curtis* Air Hoists and Cylinders . . . capacities up to 10 tons.

- **lower initial cost**
- **lower maintenance costs**
- **smooth operation and precision control**
- **self-closing, rotary disc self-grinding valves**

PENDANT AIR HOISTS . . . ideal for any lifting or lowering operation.



BRACKETED AIR CYLINDERS . . . can be mounted horizontally or vertically for lifting, lowering, pushing or pulling.

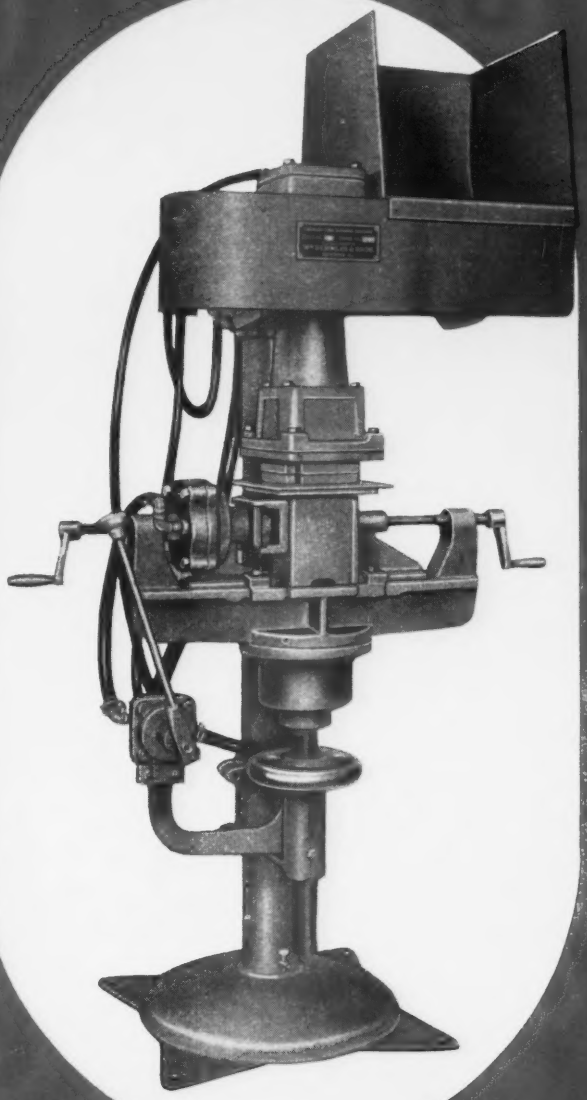
FOR COMPLETE INFORMATION ON THIS CURTIS COST-SAVING EQUIPMENT . . . WRITE TODAY!

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 KIENLEN AVENUE • ST. LOUIS 20, MISSOURI

CM-837

OTHER CURTIS PRODUCTS: Automotive Lifts and High Pressure Car Washers; Commercial and Home Air Conditioning

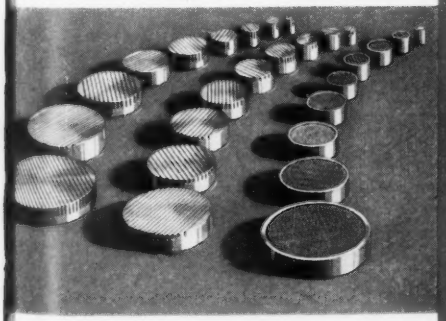
There is no substitute for the skill and knowledge of experience



DEMMLER INTRODUCED THE FIRST CORE BLOWER IN 1909

The DEMMLER model 55 CORE BLOWER

Whether it be in science or engineering, experience is the foundation on which ideas and improvements are built. Based on 45 years of core blower designing, the Demmler 55 is the perfect answer where your core blowing requirements call for fast, economical production on short run jobs. It has one hand valve that operates both vertical and horizontal core box clamps and blows the core in only 3 seconds! The model 55 handles cores up to 4 lbs. and can be used for core boxes with depths up to 10″. A Demmler leader built for profit!

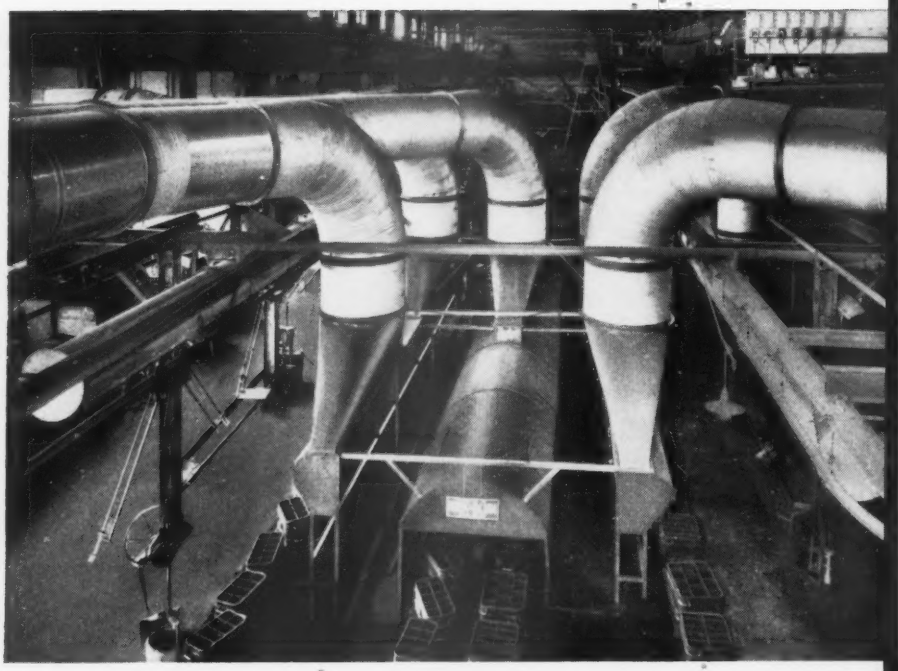


DEMMLER
Core Box Vents

You can depend, too, on Demmler precision core box vents. Brass slotted, steel slotted and screen types in sizes that meet every application.

Wm. Demmler & Bros., Kewanee, Illinois *Write for literature*

320,000 CUBIC FEET PER MINUTE!



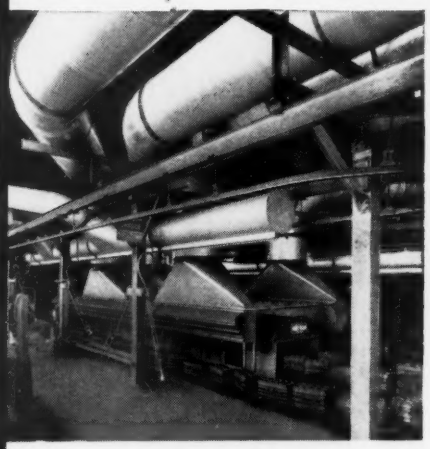
Fumes are really given the air at G.H.R. Foundry, Dayton, O., where Kirk & Blum installation serves 4 pouring lines

A 260,000 C. F. M. exhaust system whisks fumes, smoke, and gases from four pouring lines and two Kirk & Blum smoke tunnels. Offset exhaust stacks clear overhead cranes. A separate 60,000 C. F. M. supply system furnishes outside air for man cooling at the pouring lines.

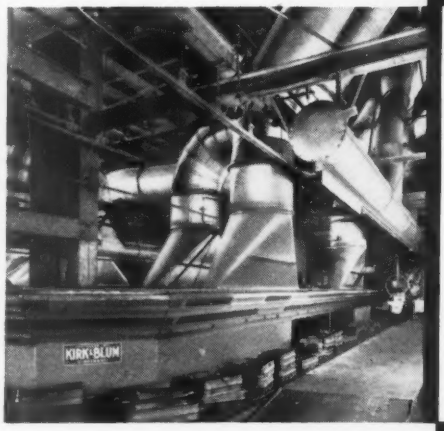
This installation at G. H. R. Foundry, Dayton, Ohio, typifies Kirk & Blum's complete service: Design, Fabrication, and Installation of Dust and Fume Control Systems.

Let Kirk & Blum design a system specifically engineered for conditions in your foundry. Put "Clean Air . . . the Invisible Tool" to work in your plant.

Write today outlining your fume and dust problems.



Fume exhaust system and forced air cooling of working area



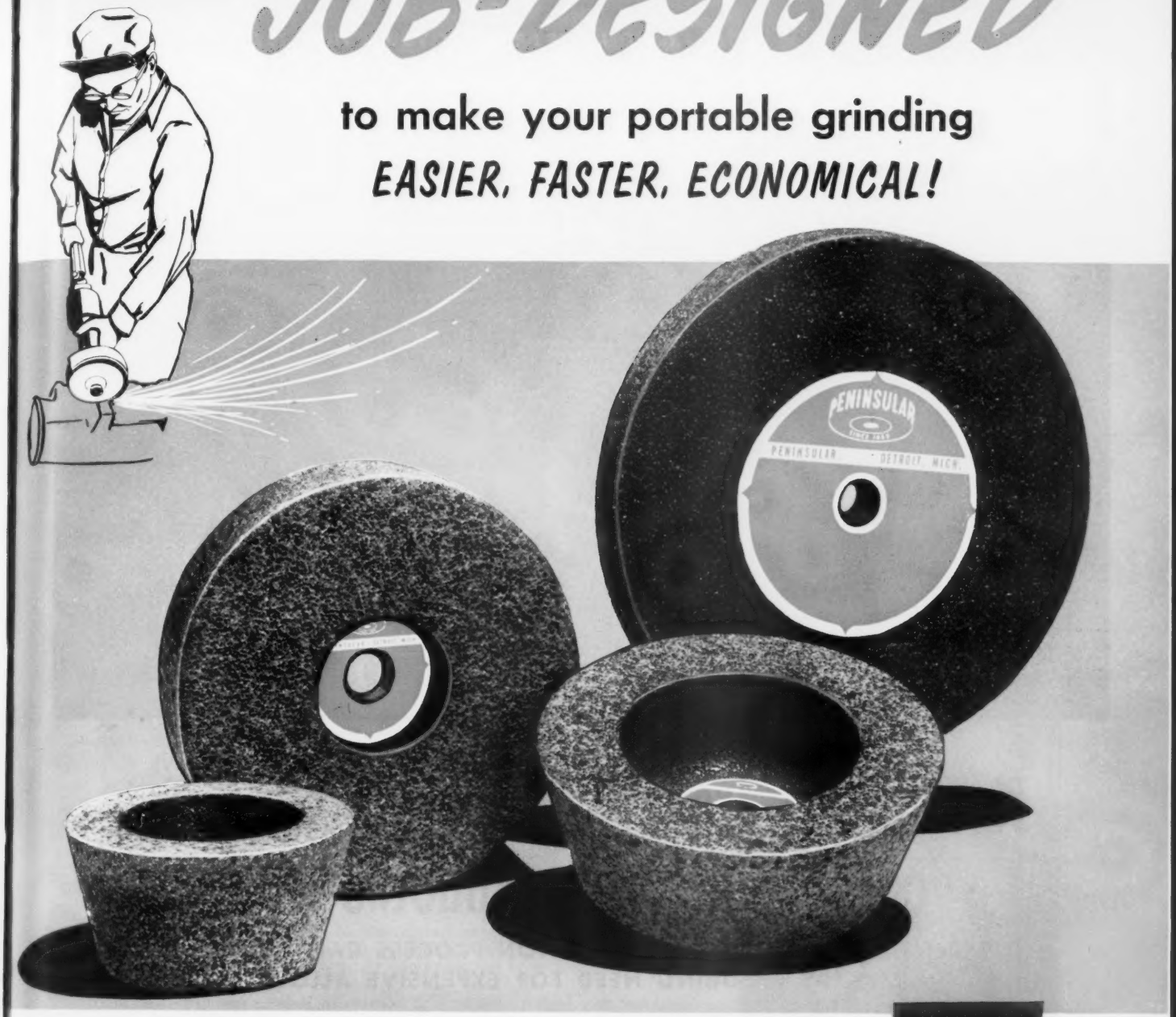
Core cooling, fume exhaust and worker cooling arrangement

THE KIRK & BLUM MANUFACTURING CO.
3239 Forrer Street Cincinnati 9, Ohio

KIRK & BLUM
FUME AND DUST CONTROL SYSTEMS

JOB-DESIGNED

to make your portable grinding EASIER, FASTER, ECONOMICAL!



Peninsular provides an extra-wide choice of abrasive shapes and sizes for time-saving, money-making solutions of many of your foundry's grinding problems. Designed for quick work on fins, parting lines and other jobs, Peninsular grinding wheels provide you unusual quality and performance backed by sixty-six years research on all kinds of grinding assignments.

Peninsular's cooler-cutting, easier-running, resinoid portables are the natural choice of particular operators everywhere. Enjoy easier, faster, economical grinding. A Peninsular abrasives engineer will help you obtain it. Write or wire us today!

Send today for your copy of the recently-issued Peninsular Catalog No. 5E. It lists complete specifications and prices on this leading line of superior abrasive items for industry.

PENINSULAR SINCE 1889

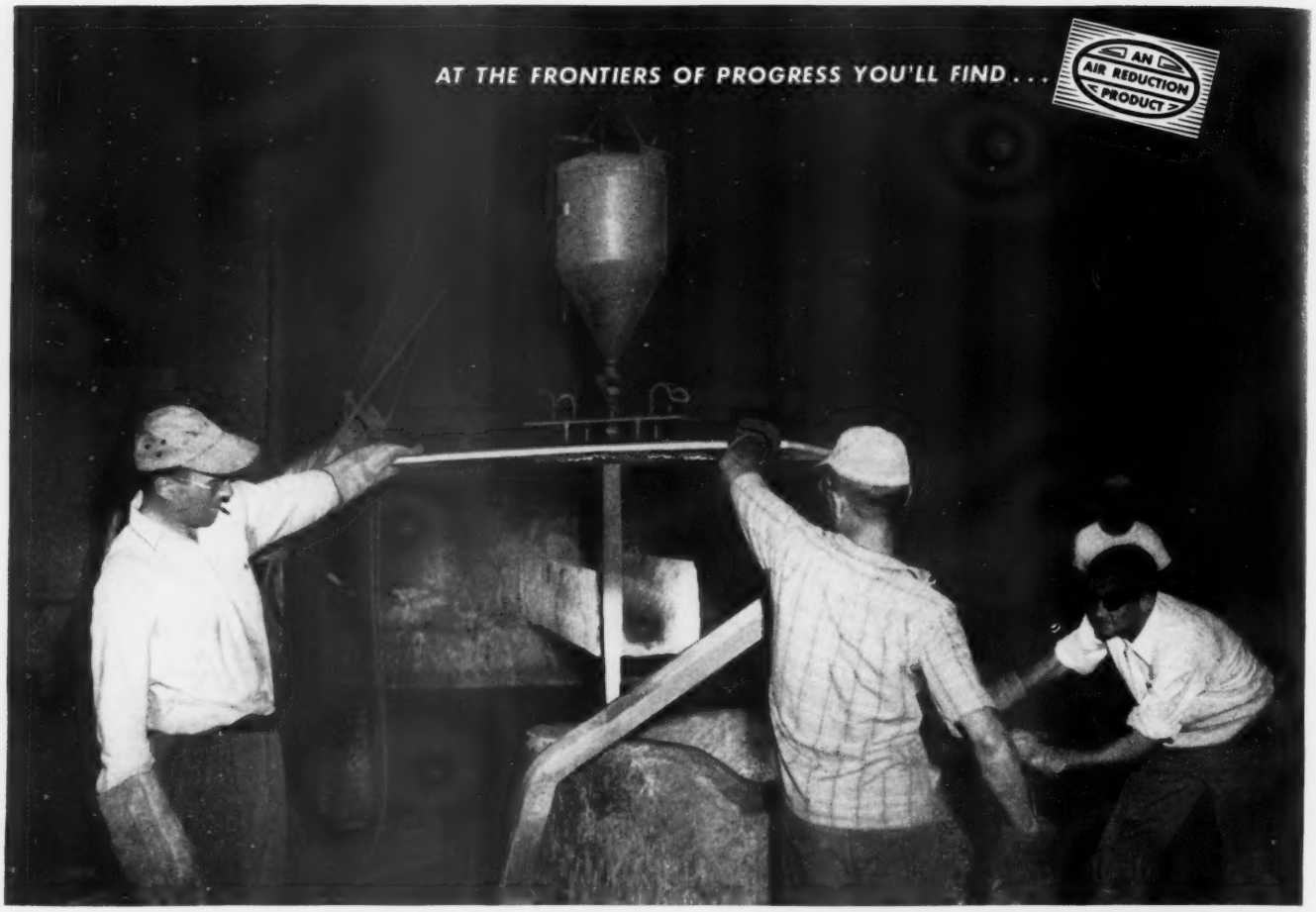
THE PENINSULAR GRINDING WHEEL DIVISION

OF ABRASIVE AND METAL PRODUCTS CO.

DETROIT, MICHIGAN

A&MP COMPANY

DISTRIBUTORS IN ALL PRINCIPAL CITIES



Lowering of Airco batch feeder into ladle for injection of calcium carbide.

Now! Gray-Iron foundries can reduce cost of producing ductile iron

INEXPENSIVE AIRCO CARBIDE INJECTION PROCESS CAN SAVE UP TO 50% BY REDUCING NEED FOR EXPENSIVE ALLOYS

Calcium carbide, dry nitrogen and a simple, inexpensive batch feeder are all that gray iron foundries need to reduce production costs of ductile iron, thanks to a new process developed by Airco.

When finely ground Airco No. 20 Special Carbide is injected with nitrogen into molten iron, the desulphurization is so uniform and efficient that ductile iron can be produced from acid cupola iron after carbide treatment. The low sulphur content of carbide treated irons—as low as 0.01% means the quantity of expensive alloys may be reduced with no sacrifice of mechanical qualities. Users of the new process have reported substantial savings by substituting less expensive alloys. Another feature of the process is its flexibility, since by using carbide treatment the same cupola charge may be used for producing a variety of grades of iron.

The new calcium carbide injection process is the result of Airco Technical Service's continuing effort to find new, profitable techniques for customers. If you have a cutting, welding or metallurgical problem, why not ask Airco to help you? Write to your nearest Airco office.

AIRCO®

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company
Represented internationally by
Airco Company International
Foreign Subsidiaries:
Air Reduction Canada Limited
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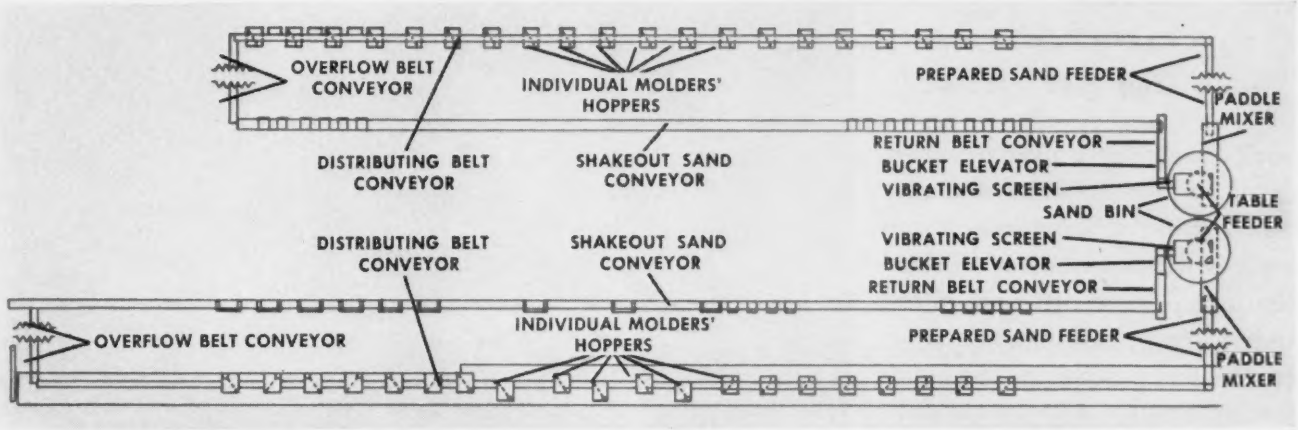
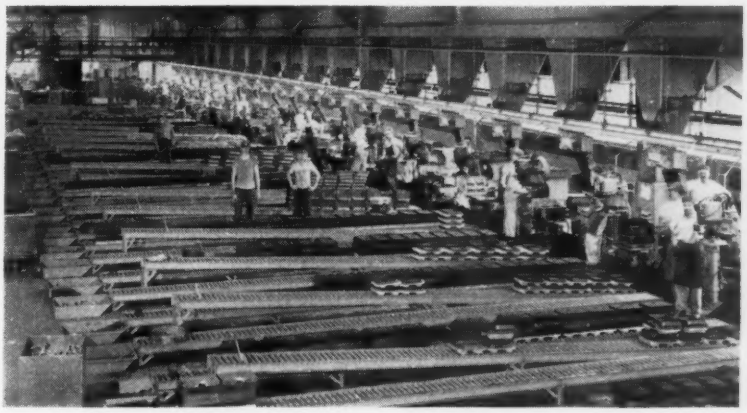
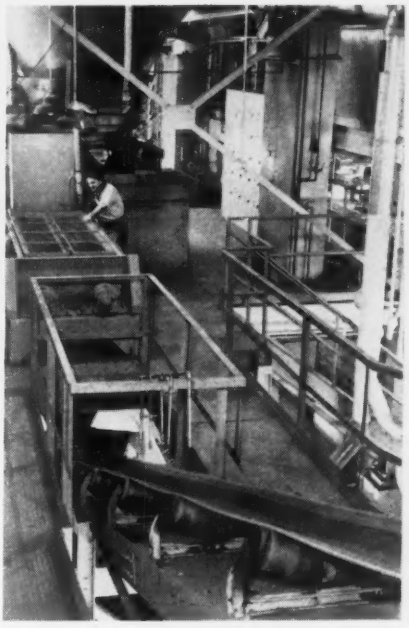
Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl-acetates,—alcohols, and other synthetic resins.

Now 3 Crouse-Hinds foundries are LINK-BELT mechanized





▲ At squeeze molding side of Crouse-Hinds' Syracuse aluminum foundry, sand travels on Link-Belt distributing belt conveyor over molders' hoppers. Overflow sand is carried on Link-Belt cross belt conveyor in background to shakeout belt conveyor, which is also fed by hoppers at foot ends of roller conveyors.



Link-Belt equipment on sand preparation floor includes storage tank, revolving plate feeder, double paddle mixer and inclined belt conveyor delivering to distributing belt conveyor. Operation involves two similar systems, each feeding 20 molders' hoppers at a capacity of 35 tph of prepared sand. ▶

New Syracuse aluminum foundry gets modern sand handling system

LINK-BELT mechanization reduces unit costs . . . speeds production . . . betters working conditions. And Crouse-Hinds has proved it — *three times since 1928.* The most recent installation — in their Syracuse aluminum foundry — provides low-cost sand handling. Sand is moved mechanically through preparation, molding, shakeout and reconditioning.

If your castings output is limited by an outdated handling system, Link-Belt mechanization is the answer. Your foundry may be large or small — gray iron, steel, malleable or non-ferrous. Whatever your requirements, Link-Belt equipment and proved engineering practices can cut your operating costs . . . conserve manpower for more exacting jobs. Our foundry specialists will pool their experience and judgment with yours and your consultants' to provide smooth coordination between operations . . . boost production in present floor space. And it all begins with a call to your nearby Link-Belt office.

13.654

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

HOW TO BUY CUT-OFF WHEELS

FOR FASTER, SAFER FOUNDRY CUTTING

. . . and get "More Use per Dollar"

Look for a wheel specially designed to take the abuse and excessive strain of heavy cutting on castings without wheel breakage. Safe, fast, efficient cutting of gates and risers on castings is a frequent foundry problem. The high cutting ability of conventional abrasive cut-off wheels is offset by their failure to withstand operational distortion and side-strain in cleaning-room operations. Good operational practice, of course, requires a steady, straight feed to make a clean cut without undue side-strain or possible shattering of the wheel. Correct mechanical reinforcement *built-in* the wheel, however, can give a degree of added protection against these operational hazards that will virtually eliminate such wheel failures . . . increase cutting efficiency and cleaning-room production. Specify the abrasive cut-off wheel reinforced for foundry operating conditions . . . specify Manhattan Reinforced Foundry Cut-Off Wheels.

MANHATTAN REINFORCED CUT-OFF WHEELS

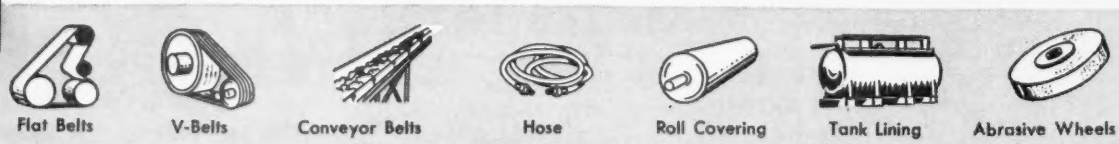
These cut-off wheels are reinforced two ways. Special fibers in the bond increase by 50% the strength to withstand destruction by centrifugal force. Special industrial fabric lateral reinforcement enables Manhattan Reinforced Cut-Off Wheels to perform under adverse conditions of side-strain far beyond the endurance of conventional cut-off wheels. In addition, actual field reports indicate up to 25% higher cleaning-room production with these wheels on both stationary and swing-frame cut-off machines. Ask your Manhattan representative to show you how to get faster, safer cutting and increased production . . . "More Use per Dollar" . . . with Manhattan Reinforced Foundry Cut-Off Wheels and other types of high speed, heavy duty wheels.

RM 528-F

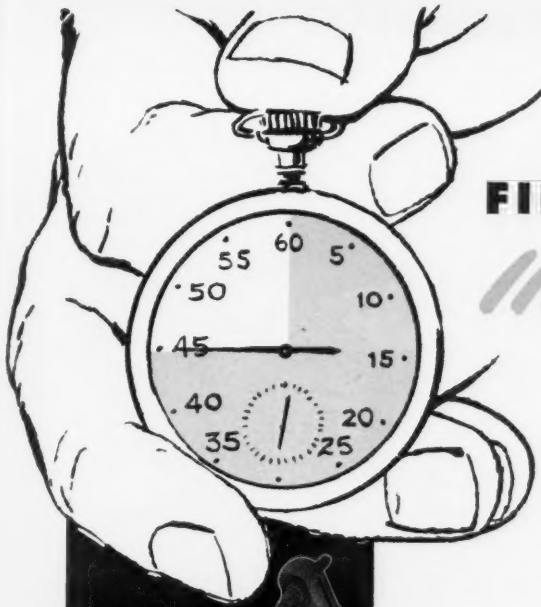
WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls



FINISHED CORES
IN 45 SECONDS...

IT'S A FACT . . . intricate and extremely accurate *hollow cores* can be blown and cured in less than a minute!

These new hollow cores provide valuable production advantages at remarkably low cost. They eliminate venting problems . . . assure closer tolerances and more uniform castings . . . permit faster, easier shake-out . . . can be mass produced by one man without secondary operations or use of driers and ovens.

WITH THE NEW SPO holo-core MACHINE

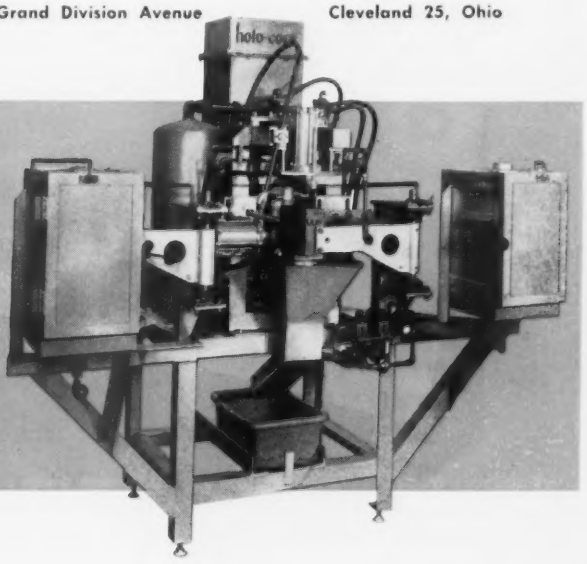
This revolutionary development in core production is made possible by the new SPO Holo-Core machine. Now available in two sizes, it features the well-known SPO characteristics of speed, simplicity, safety and sturdy maintenance-free construction. And . . . like all SPO equipment . . . the Holo-Core machine is designed to give you higher production and profits. *For details and prices . . .*

WRITE TODAY FOR NEW BULLETIN SC-100

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

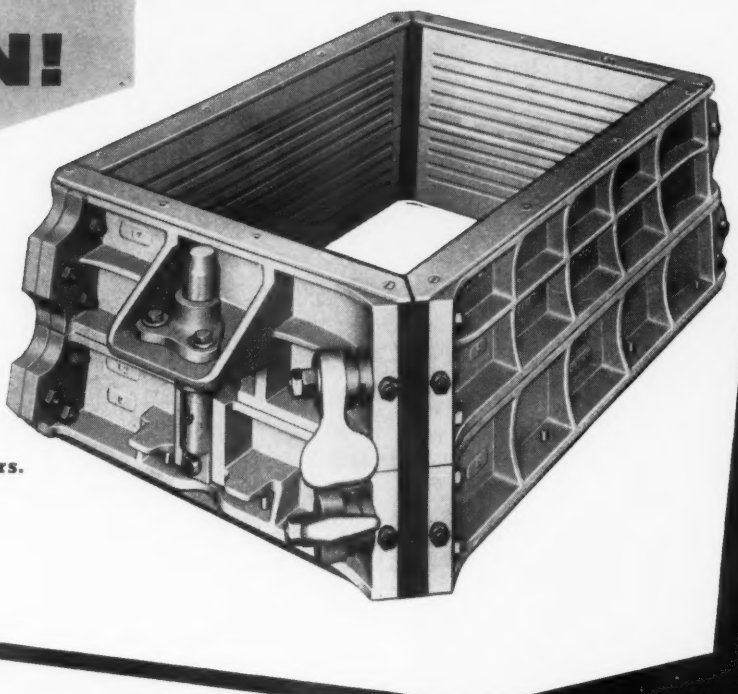
SPO INCORPORATED

6449 Grand Division Avenue Cleveland 25, Ohio

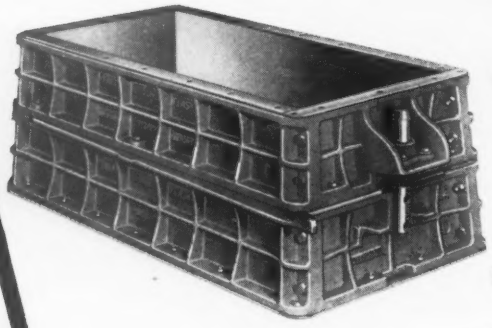


6369-S1

Performance PROVEN!



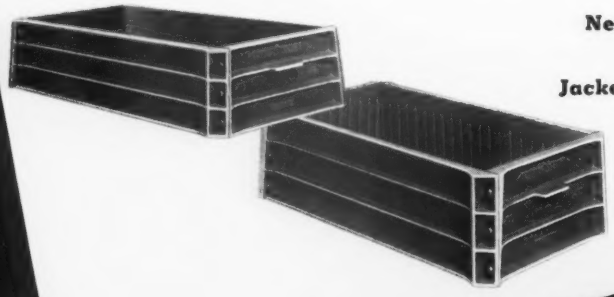
Fremont magnesium Spreadlock Flasks by actual use have been proved easier to handle . . . much sturdier than aluminum. They take abuse . . . last longer. Accurately machined, they assure more exacting work. The men like them. No sand can lodge in the corners. Gaps are completely closed by long-life, replaceable live rubber inserts.



GUARANTEED PERFECT ALIGNMENT

The foolproof GROOVLOCK pin on Fremont Standard Slip Flasks is the difference.

SAVE IMPORTANT MONEY



New sides or ends can be quickly inserted in Fremont Cast Iron or Cast Aluminum Jackets. Entire jackets need never be scrapped.

Write today for free literature and prices. All orders given prompt attention.

The Fremont FLASK Co.
Fremont, Ohio

Detroit Electric Furnace Announces

LIBERAL LEASING PLAN

Get production savings from Detroit ROCKING Electric Furnaces without heavy capital investment

A liberal leasing plan is now being offered by Detroit Electric Furnace to allow more foundries to enjoy the production economies of these exceptional indirect arc electric furnaces. Now manufacturers can have modern, efficient metal melting equipment without large outlays of working capital.

Under the DEF leasing plan, you'll find that manufacturing savings from reduced melt losses, less scrap, and savings in labor and time will more than pay for the furnace lease.

The original lease term of three years requires a reasonable deposit and a low monthly rental computed on the commercial purchase price of the equipment. Lease may be renewed for two more three-year terms at considerably reduced rentals. Minimum value of equipment which will be leased is $5,000.

A lease renewal or a purchase (fair market value) option may be exercised at any time after the initial three-year term.

This leasing plan is available on all Detroit Rocking Electric Furnaces and equipment. Take advantage of this opportunity to have these famous furnaces working for you *without large capital investment.* A letter to Department L, Detroit Electric Furnace Division, will bring you complete information.

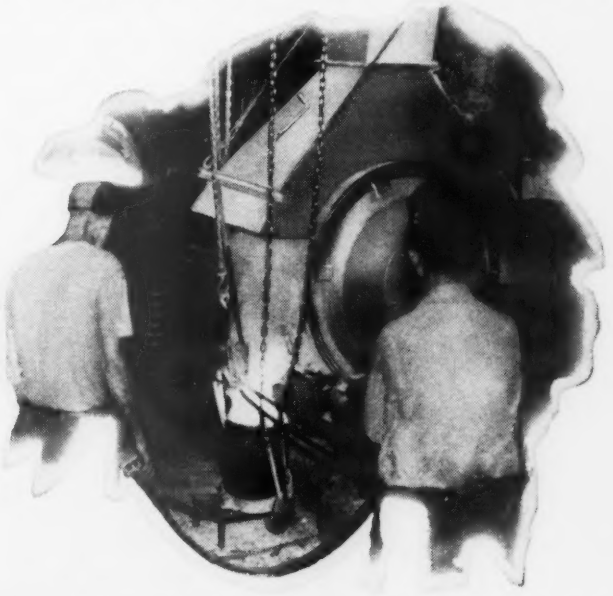
Here's what users say about Detroit ROCKING Electric Furnaces

A brass foundry writes—

"We have been using Detroit Electric Furnaces for many years and at present have 4 of your Type LFN #500, which have proven most satisfactory. Your furnace equipment has enabled us to produce our hot metal requirements for our foundry with approximately one-fourth of the labor required with other type melting equipment, with approximately 70% saving in our metal shrinkage, as well as a saving in fuel and maintenance cost."

A gray iron and alloyed castings producer—

"Over a long period of years we have successfully used Detroit Electric Furnaces and we have demonstrated to our own satisfaction that they have a definite place in our melting operations. As far as we are concerned, certain of our gray iron and alloy iron castings are produced with best results in our Detroit furnaces."



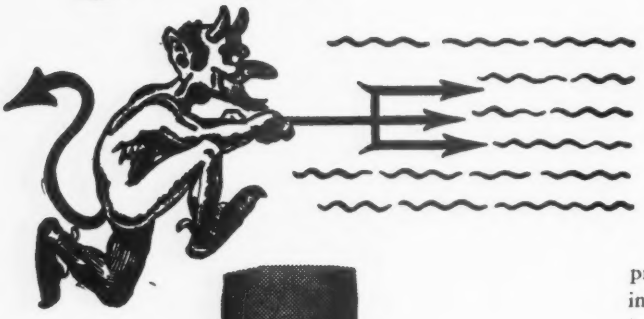
DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY • Bay City, Michigan

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N.Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

Soffel's

THERMOTOMIC® COMPOUND and CARBON FREE LIQUIDIZERS



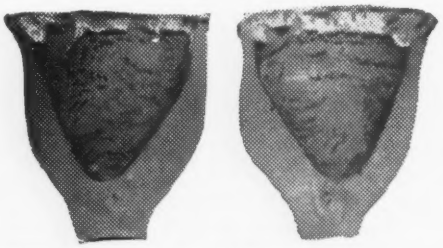
Keeps Metal Molten!

for Steel, Iron, Aluminum
Brass, Bronze, Copper

THERMOTOMIC "X" is a patented exothermic compound that produces a temperature over 3500° F. It can be molded or baked into any desired shape the same as sand cores. THERMOTOMIC "X" is used as knock off core rings with 1½ inch feeder opening under risers of feeding heads, also as insulating sleeves, inserts and facings, or mixed with facing sand where it is desired to maintain fluidity of the casting metal. Shorter and more compact heads and risers can be used. The small feeder opening permits easy removal of feeding heads and risers. In conjunction with THERMOTOMIC COMPOUNDS, we recommend the use of exothermic CARBON FREE LIQUIDIZER NO. 5 on top of the metal in the heads or risers as an insulating cover. For green sand casting molds, use THERMOTOMIC WP (Waterproof).

U. S. Patents No. 2,490,327 and No. 2,500,097

300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.



NOTE THESE TYPICAL RESULTS FROM THE USE OF SOFFEL'S *Carbon Free* LIQUIDIZER

With the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, this 6″ x 6″ chrome-nickel-steel riser was reduced in weight from 32 pounds to 13 pounds average. A savings of 19 pounds of salable metal, normally discarded as scrap, was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily, saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.

THERMOTOMIC *Strainer Core* PRODUCES MONEL CASTINGS 270 LBS. SOLID

Made by direct pouring through the Thermotomic strainer core under the feeding head.

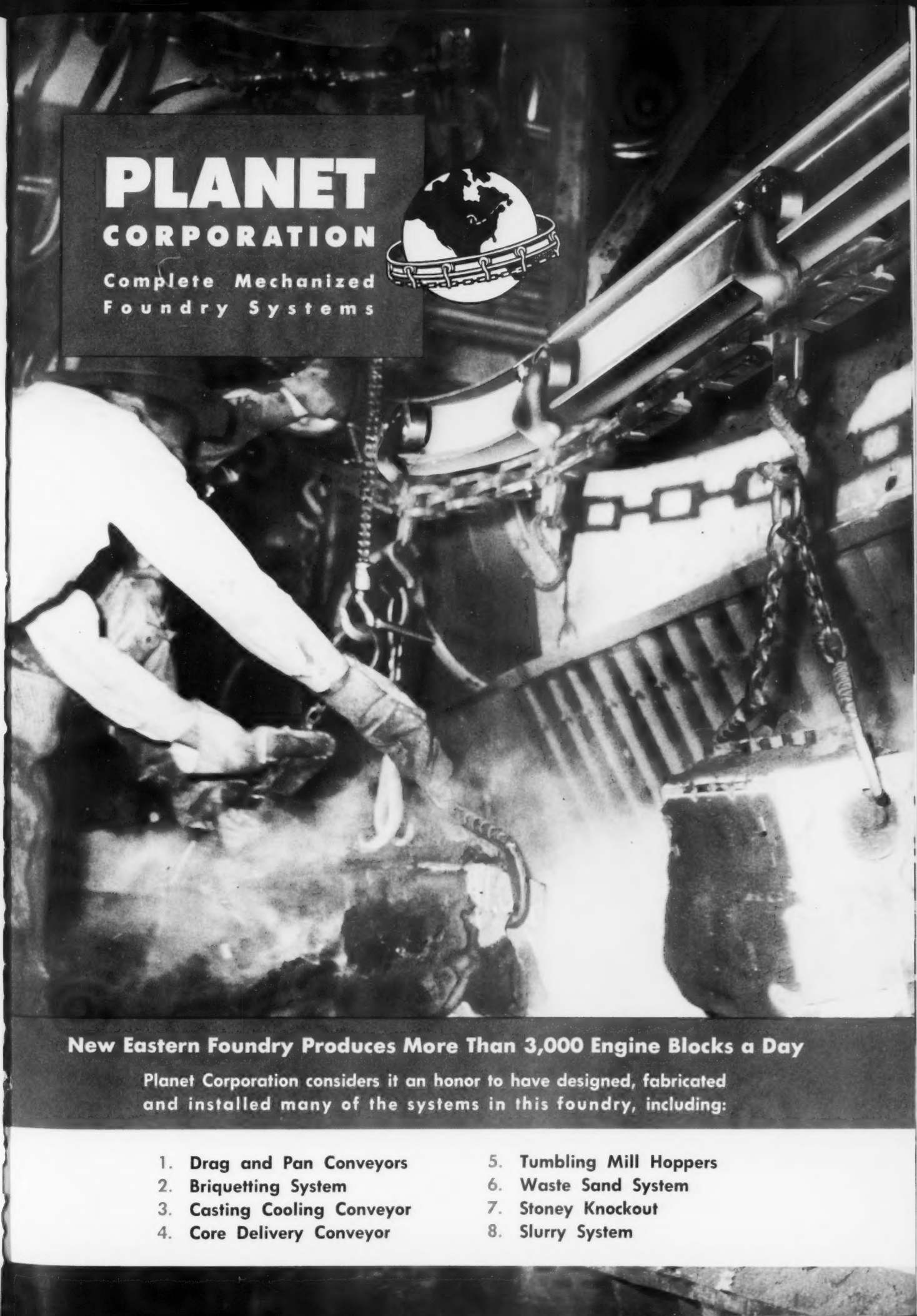
No chills were used, no shrinkage at the flange. Note depth of shrinkage in the feeding head.

BEWARE OF IMITATIONS! We are the originators of CARBON FREE LIQUIDIZER and THERMOTOMIC COMPOUNDS

PITTSBURGH METALS PURIFYING COMPANY

1352 MARVISTA ST., N.S. PITTSBURGH 12, PA.

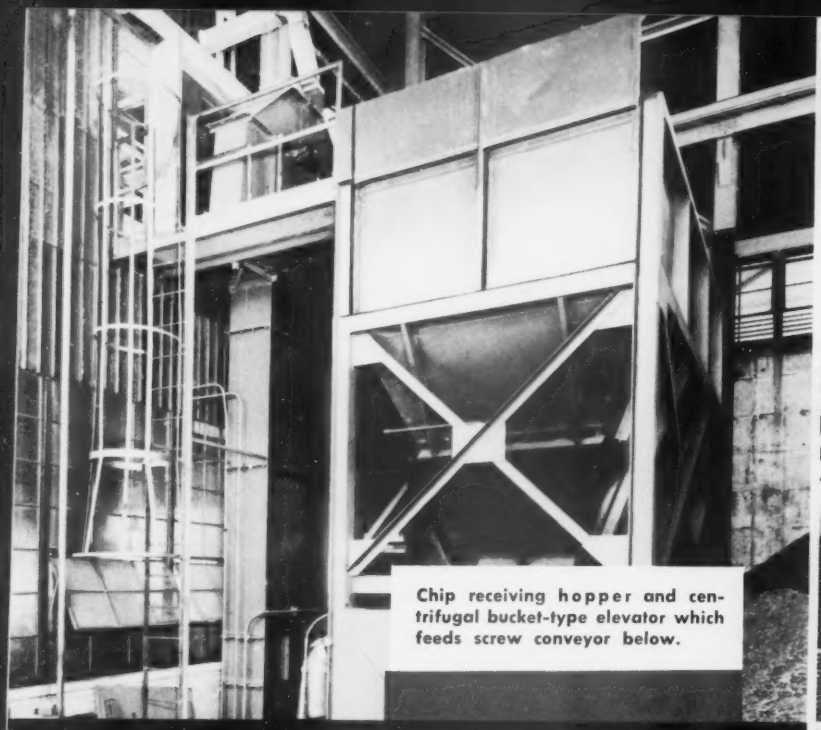
WORLD'S LARGEST MANUFACTURERS OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS



New Eastern Foundry Produces More Than 3,000 Engine Blocks a Day

Planet Corporation considers it an honor to have designed, fabricated and installed many of the systems in this foundry, including:

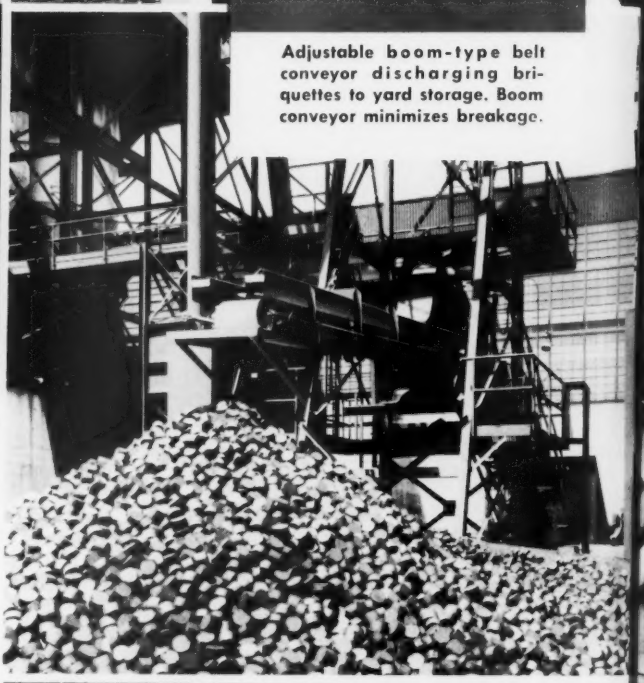
1. Drag and Pan Conveyors
2. Briquetting System
3. Casting Cooling Conveyor
4. Core Delivery Conveyor
5. Tumbling Mill Hoppers
6. Waste Sand System
7. Stoney Knockout
8. Slurry System



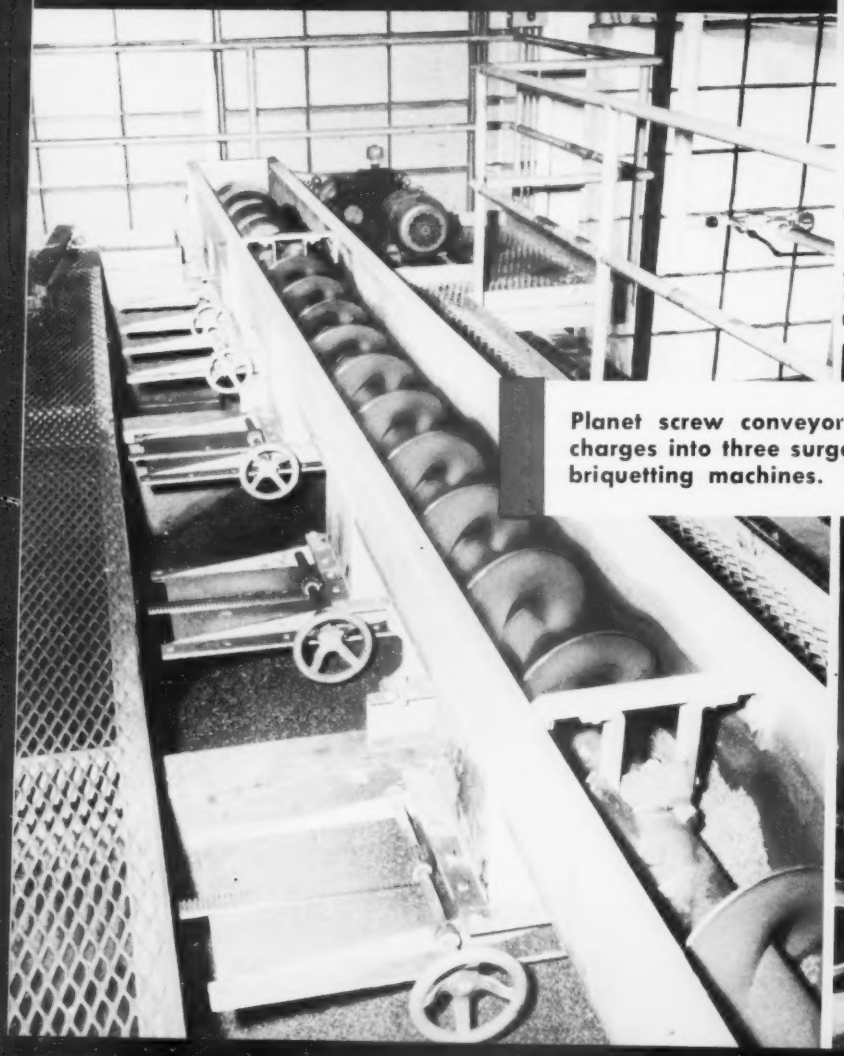
Chip receiving hopper and centrifugal bucket-type elevator which feeds screw conveyor below.

Belt conveyor for transferring briquettes to boom conveyor.

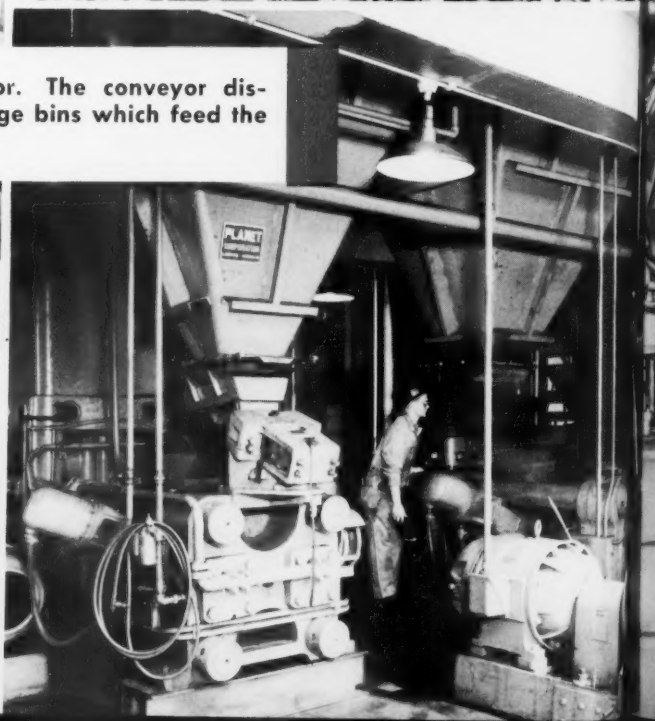
BRIQUETTING



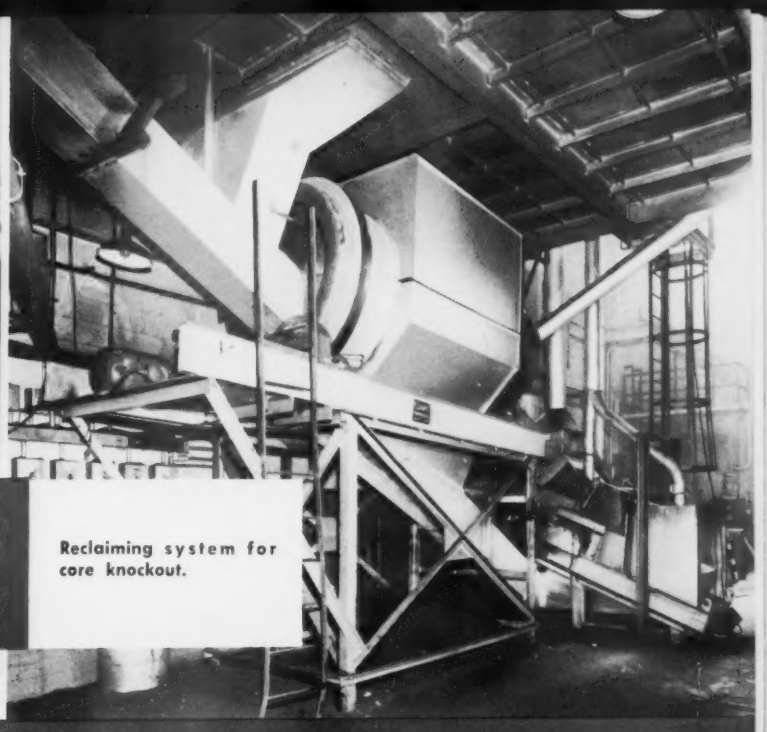
Adjustable boom-type belt conveyor discharging briquettes to yard storage. Boom conveyor minimizes breakage.



Planet screw conveyor. The conveyor discharges into three surge bins which feed the briquetting machines.



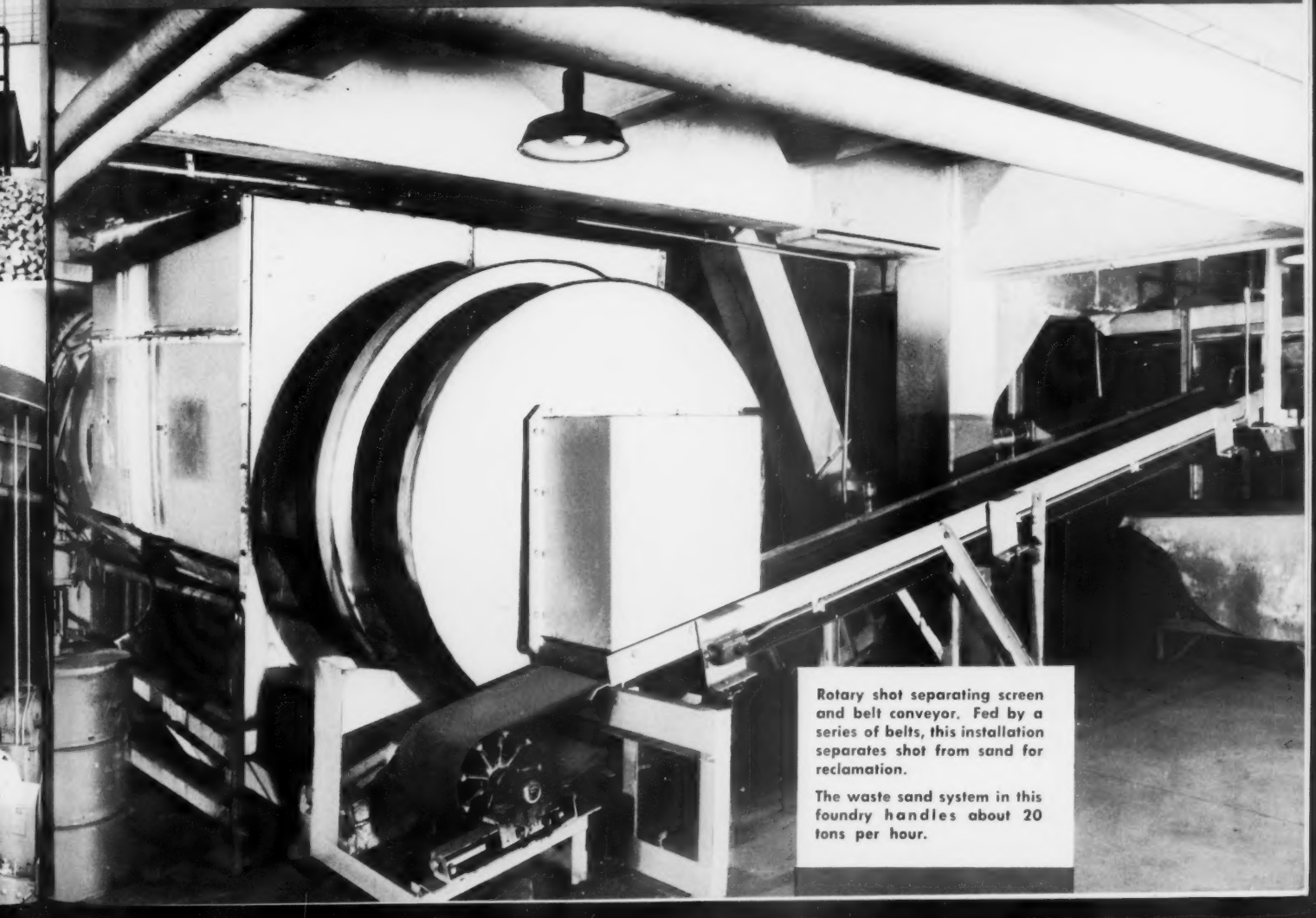
Castings being transferred from mold conveyor to Planet 6" I-Beam trolley conveyor for knockout and cooling.



Reclaiming system for core knockout.

PLANET CORPORATION

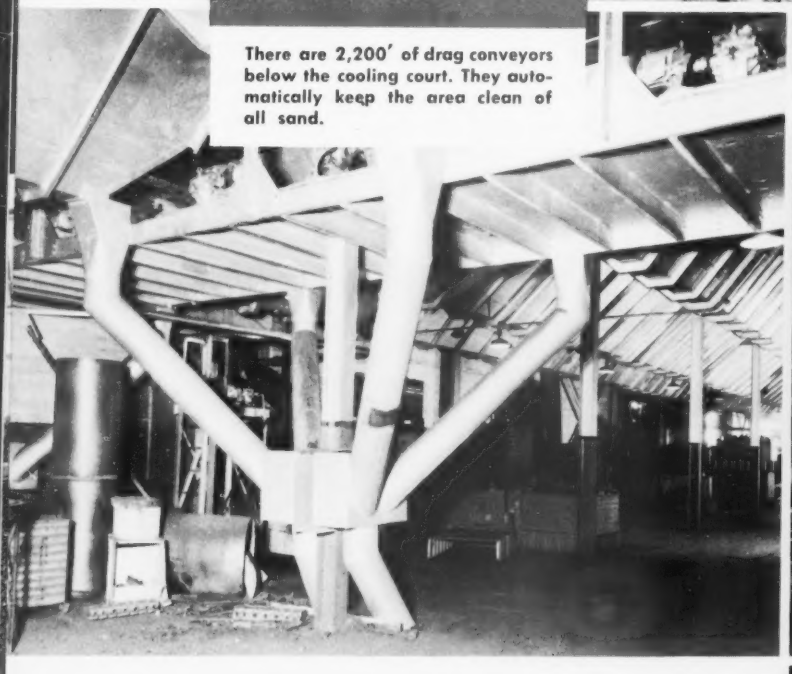
COMPLETE MECHANIZED FOUNDRY SYSTEMS



Rotary shot separating screen and belt conveyor. Fed by a series of belts, this installation separates shot from sand for reclamation.

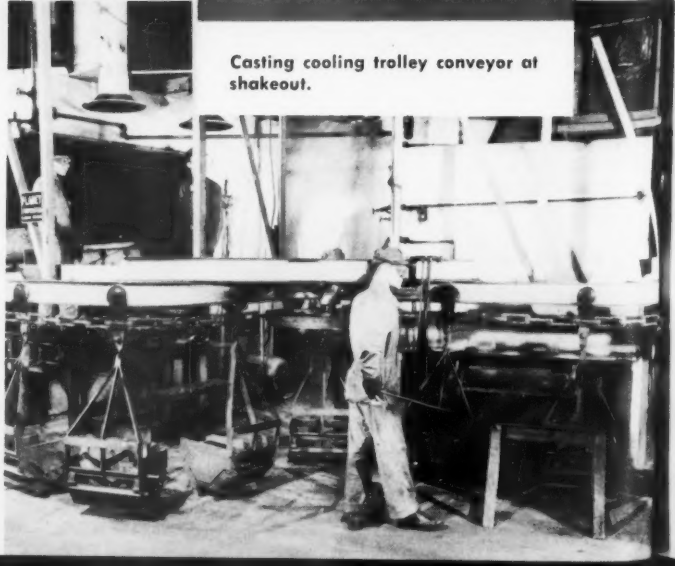
The waste sand system in this foundry handles about 20 tons per hour.

Planet Corporation designed and installed 14,000′ of 6″ I-Beam trolley conveyor to move all castings from shakeout areas to the cleaning room, passing through the cooling court above.



There are 2,200′ of drag conveyors below the cooling court. They automatically keep the area clean of all sand.

One of six flat top pan conveyors which move castings through grinding and cleaning operations.



Casting cooling trolley conveyor at shakeout.

PLANET
CORPORATION
1818 SUNSET AVENUE
LANSING, MICHIGAN

Once again — here's proof positive —
"It Pays to Plan with Planet".

Powder-Cutting Saves $2,000

This 3-ton, 13-in. thick manganese-bronze flywheel casting was reduced to furnace-charging size by powder-cutting in less than 8 hours. Previous methods required over 16 hr. to cut up a casting only 4-in. thick. Powder-cutting proved to be the most economical method for this job.

Powder-cutting replaced cold-sawing in this foundry operation, and did three times the cutting in half the time.

LINDE engineers were called in to help solve the problem of reducing giant flywheel castings to furnace-charging size. The castings had been part of an experimental program to develop accurately balanced flywheels for diesel engines. Test castings had to be cut for remelting. . . . But because of their great size, scrapping by formerly used methods would have been costly—if possible at all. LINDE advised powder-cutting.

In powder-cutting, a powdered metal is added to the oxygen stream to raise the temperature of the cutting flame, and increase the speed of the severing action. Among other things foundries are using powder-cutting to remove gates and risers from stainless steel castings, to wash away sand-incrusted casting surfaces, and for gouging out defects prior to repair welding.

LINDE service engineers will be glad to help you determine the best powder-cutting setups or other uses of the oxy-acetylene process for your needs.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto
(formerly Dominion Oxygen Company)

Linde Trade-Mark

"Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

PURITE

stacks up best for fluxing and desulphurizing

BECAUSE Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured.

BECAUSE Purite gives 100% fluxing action in the cupola —100% desulphurizing action in the ladle.

BECAUSE Purite is time-tested and proved for rapid and unsurpassed desulphurizing uniformity.

BECAUSE Purite permits the use of higher-sulphur raw materials.

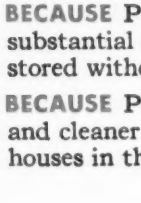
BECAUSE Purite is 100% pure fused soda ash—you do not pay for inert materials.

BECAUSE Purite comes in uniform 2-lb. pigs—no weighing or measuring required.

BECAUSE Purite does not crumble—is easy to handle —no waste, no dust.

BECAUSE Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

BECAUSE Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.



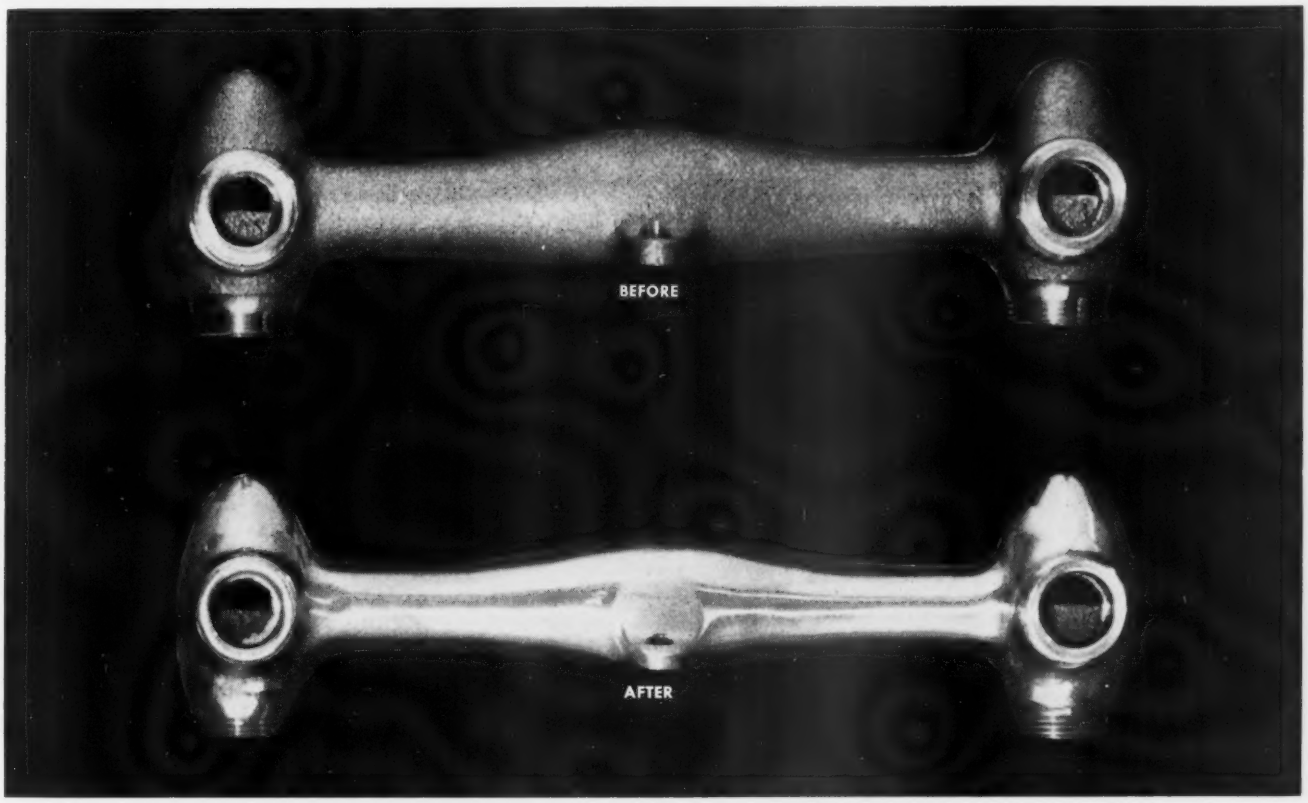
MATHIESON CHEMICALS

OLIN MATHIESON CHEMICAL CORPORATION

INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

3097

3M METHOD — better from start to finish



St. Paul foundry increases production 60% with 3M Abrasive Belts!

80 Castings per belt! 3M Coated Abrasives are long-lasting production tools, designed to do the best possible grinding and finishing job at lowest cost to you.

Union Brass & Metal Manufacturing Co., increased production from 25 finished acorn faucets per hour to 40, when they switched to the 3M Method using "Wetordry" type belts. This manufacturer of brass plumbing fixtures formerly used set up wheels for grinding and polishing—found the wheels slow, finishes unsatisfactory. When the 3M Method was installed (using Grit #80 "Wetordry" belts for roughing, Grit #180 belts for polishing) production increased 60% with far better and more consistent finishes, less operator fatigue and greater safety.

You can benefit with 3M Coated Abrasives, too, no matter how tough your grinding or finishing problem. Your 3M Representative is an abrasives expert who can help you install or adapt your present equipment to the 3M Method. Send coupon today for facts. There's no cost or obligation.

Write Today for FREE Booklet!

Minnesota Mining and Mfg. Co.
Dept. CN-95, St. Paul 6, Minn.

☐ Send me free booklet on grinding non-ferrous metals.
☐ I'd like to talk to a 3M representative.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

My distributor is_____

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: London, Ont., Can. Export: 122 E. 42nd St., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

3M COMPANY

AS PARTNERS IN YOUR PROGRESS

...we have great confidence in you – our customers!

It is because we have this confidence in you that we substantially increased the production capacity of our Niagara Falls, N. Y. and Morganton, N. C. plants.

It is because of this confidence that we are constantly engaged in far-reaching research and developmental activities to insure your steadily increasing acceptance of our products in the years to come.

And it is because of this confidence in you that we look forward to still greater rewards from our partnership in your progress — to the degree that they are merited through the dependability of our products and the alertness of our service.

ELECTRODE GLC DIVISION

Great Lakes Carbon Corporation

GRAPHITE ELECTRODES, ANODES, MOLDS and SPECIALTIES

ADMINISTRATIVE OFFICE: 18 East 48th Street, New York 17, N. Y.
PLANTS: Niagara Falls, N. Y., Morganton, N. C.
OTHER OFFICES: Niagara Falls, N. Y., Oak Park, Ill., Pittsburgh, Pa.

Sales Agents in Other Countries: Great Northern Carbon & Chemical Co., Ltd., Montreal;
Overseas Carbon & Coke Company, Inc., Geneva; Great Eastern Carbon & Chemical Co., Inc., Chiyoda-Ku, Tokyo.

Vigorous VIBRATION for Maximum Loads

When you specify *Foundromatic* shakeout, you don't have to buy extra capacity to get adequate vibration under rated loads. This shakeout weighs more than 40% of its rated capacity — an *extra* reserve of weight that assures rapid shakeout on even the heaviest castings or flasks.

Along with the extra weight that slashes knockout time, the *Foundromatic* shakeout has rugged construction that means steady operation. Free-floating shakeout body, including heavy reinforced deck supports and converging sand discharge hopper, is a sturdy one-piece unit. Entire structure is stress relieved after welding to provide maximum resistance to shock impact loads. Heavy flat deck minimizes flask damage. Simplified, two-bearing mechanism is not affected by overloads . . . requires less maintenance. Oversized bearings provide extra long and dependable service.

For complete information, see your A-C representative or write Allis-Chalmers, Milwaukee 1, Wis. Ask for Bulletin 07B6365B.

"FOUNDROMATIC" SHAKEOUTS

Smooth Stopping

New control replaces friction checks. The patented Allis-Chalmers stop control for *Foundromatic* shakeouts eliminates stopping bounce and excessive friction check maintenance. This control reverses the torque of driving motor after speed has been reduced. With the motor torque opposing the rotation of the mechanism, the shakeout is brought to a stop *before* amplitude builds up.

Because there is no excessive bounce, castings and flasks are not damaged, crane hitches remain in place . . . motor and drive last longer. Send for Bulletin 07B8141.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-4625

DO YOU HAVE CONVEYOR BEARING TROUBLES WITH HARD SAND OR OTHER ABRASIVE MATERIAL?

The Joy Limberoller idler installation shown above is in a magnesium foundry, supporting a 30″ belt which carries abrasive material up a 35° slope. *To date, these idlers have been on the job 10 times longer than conventional idlers previously lasted—and they're still going strong!*

ONLY 2 BEARINGS, UP OUT OF THE DIRT ...The Joy Limberoller idler consists of neoprene discs molded on neoprene-covered flexible steel cable. It is suspended from two bearings, one on each end, *out of the dirt zone.* This distinctive design, field-proved by thousands of idlers already in service, averts fouled idler rolls—protects the belt from damage—reduces your maintenance to a fraction.

OTHER ADVANTAGES, TOO . . . Joy idlers are self-training—they conform to the load with a cushioned grip which supports the loaded belt without slipping and reduces belt wear. They resist corrosion, abrasion, flame and grease—weigh ⅔ less than steel idlers, and handle bulk or packaged materials equally well. They're easily changed *without stopping the belt,* and compactly stored.

Whatever your belt conveyor job may be, let us help you to make it more efficient and economical. Joy Limberoller Idlers are available for belt widths of 18″, 24″, 30″ and 36″—and you'll find them easier, faster and less costly to install, maintain, knock down and move than any other conveyor idler on the market. ● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WRITE FOR COMPLETE DETAILS

Ask for free *Bulletin LD-103D.* It gives complete information on the unique Limberoller Idler, and we'll be glad to supplement it with engineering assistance on your particular problem.

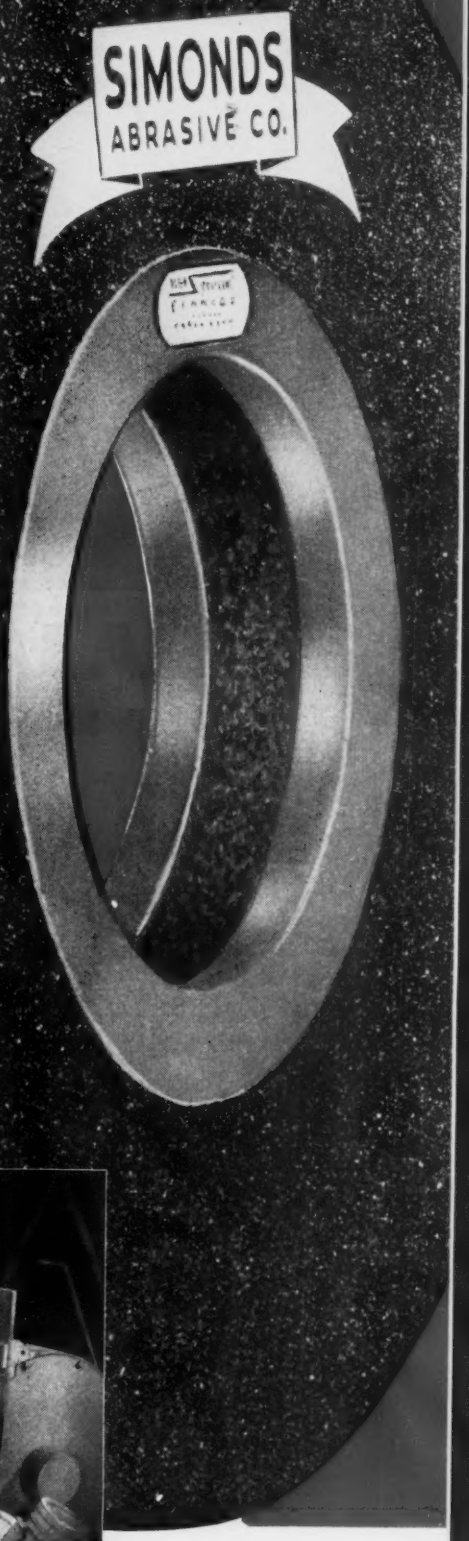
Consult a Joy Engineer

JOY

SINCE 1851—OVER 100 YEARS OF ENGINEERING LEADERSHIP

W&D 156968

Lasts Longer!



SURVEY

DESCRIPTION OF WORK

Snagging fins and risers from cast-iron pipe fittings

WHEEL

Simonds 24 x 2½ x 12 wheel with Reinforcing Flanges

PERFORMANCE

Good cutting action: no dressing needed. Gave 1/3 to 1/2 longer life than competitive wheels.

SIMONDS
ABRASIVE CO.

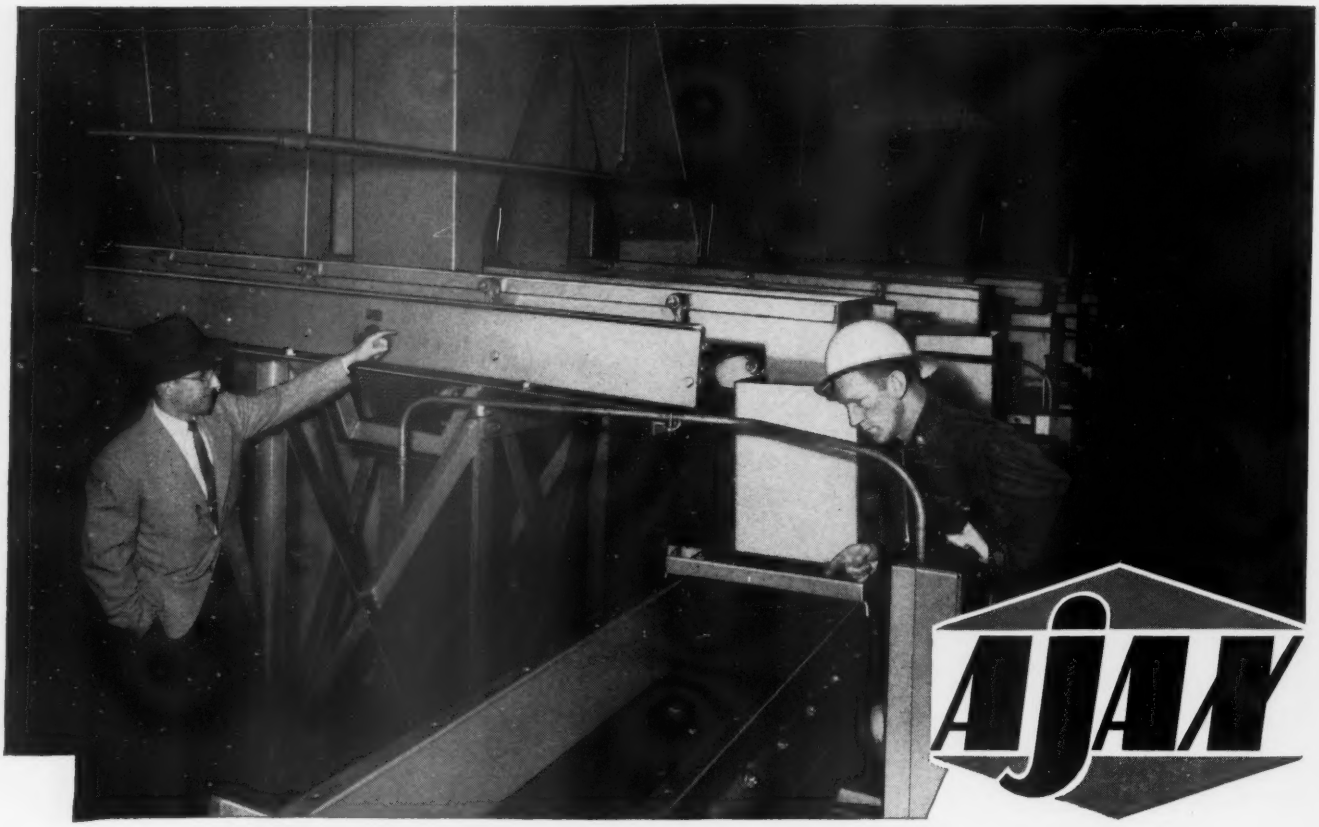
SNAGGING WHEELS

WITH REINFORCING FLANGES

These wheels head into work with real productive bite. Patented Reinforcing Flanges prevent radial cracks . . . add extra safety for the stress of your toughest grinding jobs. Write for bulletin ESA 62.

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and Simonds Canada Abrasive Co., Ltd., Arvida, Quebec



AJAX LO-VEYORS

BUILT INTO MODERN FOUNDRY SYSTEM

Photograph shows typical arrangement of Ajax Lo-Veyors with motor driven reciprocating drive mounted below.

Elimination of exposed bearings reduces maintenance cost of Ajax Lo-Veyors particularly under foundry conditions where abrasive sand is encountered.

Ajax Lo-Veyors are available in a wide range of lengths and capacities to fit every condition.

Rivers of foundry sand flow from shakeouts to tumblers to dryers on Ajax Lo-Veyors. Tonnage is measured in thousands. Around-the-clock operation is building new production records.

The photograph shows just a small part of this new ultra-modern automotive foundry equipped with Ajax Lo-Veyors.

They are cutting costs in conveying, separating and screening foundry sand. Whether you are an original equipment manufacturer, a captive or custom foundry, . . . look into the performance, reliability and economy of Ajax Lo-Veyors.

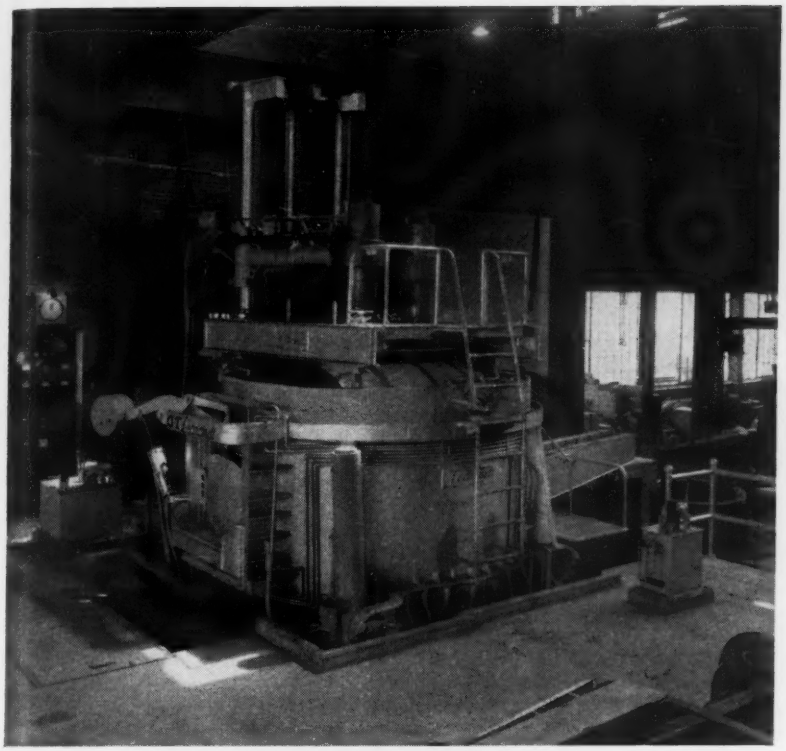
Write for Bulletin 39 right now.

AJAX FLEXIBLE COUPLING CO. INC.

Westfield, N.Y.

REPRESENTATIVES IN PRINCIPAL CITIES

"A Lectromelt Furnace
is a good instrument to work with...



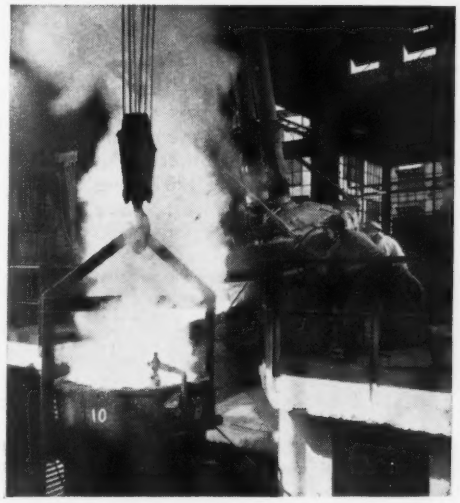
WE GOT ONTO CONTROL ON OUR FIRST TRY, AND KEPT IT ON,"

says **August Rossetti,**
General Superintendent,
McConway & Torley Corp., Pittsburgh

"WE'VE been very, very successful with our Lectromelt* Furnaces—producing both carbon and alloy steels for railroad castings, armor and gun shields, many to rigid radiographic specifications."

Getting on control and holding it there is a familiar story to long-time Lectromelt Furnace users. Foundries are better able to duplicate heat after heat, maintaining top quality because of closer regulation of power and electrodes. The flexibility of Lectromelt Furnaces permits quick shifts in metal production, making it more profitable to go after special casting business.

For a free copy of Catalog No. 9, or for engineering help in adapting an electric arc furnace to your foundry, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.



This 12-ton OT Lectromelt Furnace was installed in 1945.

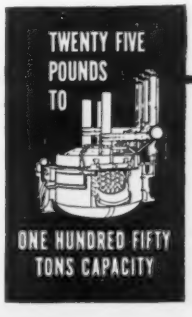
6-ton PT Lectromelt Furnace installed in 1942.

Manufactured in...GERMANY: Friedrich Kocks GMBH, Dusseldorf...ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege ... SPAIN: General Electrica Espanola, Bilbao ... ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF

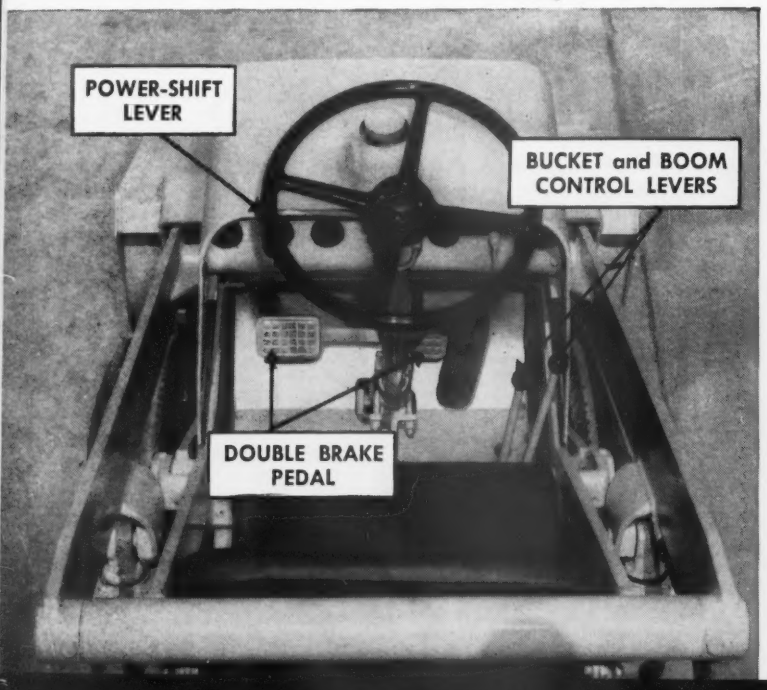
MOORE RAPID

WHEN YOU MELT... *Lectromelt*



It's a pleasure to work here! There's plenty of leg room in the 12B because there are fewer operating controls . . . no clutch pedal, no conventional gear-shift levers. The power-shift lever on the steering column controls the shifts: High—11.2 mph; Low—5.6 mph; Reverse—10.5 mph.

LOOK, NO CLUTCH. Without taking his left hand from the steering wheel, the operator can move the power-shift lever to any speed or direction . . . even when moving. The right hand is free for the bucket controls; feet are free for brake and accelerator. The 12B is more maneuverable in tight quarters because the operator doesn't have to stop to shift.



Report on the 15 cu. ft. MICHIGAN 12B:

New Tractor Shovel features power-shifting, twenty per cent more weight and power

Heavier and more powerful than comparable machines, and infinitely easier to operate—that's the new MICHIGAN 12B. There's no clutch pedal or engine clutch on the 12B: Clark's power-shift transmission completely eliminates this notorious cause of excessive maintenance and down time. From the cutting edge of the 15 cu. ft. bucket to the flywheel of the 44 or 42 horsepower engine (gas or diesel), the MICHIGAN 12B is simply *more* machine.

20% more weight and power. At 6250 lbs. (6350 lbs. diesel), the 12B is 20% heavier than most machines in its class. With 44 or 42 horsepower, gas or diesel, it is 20% more powerful. This margin of weight and power, plus bucket break-out action, enables the 12B to dig its way into material where other machines merely spin their wheels. The 12B's extra weight, low center of gravity and low-level bucket carry-position contribute to its superior stability: you can handle maximum loads safely and fast within its short turning radius.

Exclusive Clark power-train. The complete power-train of the new 12B is designed and manufactured by Clark. This combination of torque converter, power-shift transmission and planetary wheel axle gives you the most advanced industrial power-train on the market today. It was designed especially for industrial Tractor Shovel service—based on Clark's many years of experience as the leading manufacturer of industrial material handling equipment.

Instant power-shifting. Engine torque is multiplied up to 300% by the Clark torque converter—automatic torque build-up as you meet tighter, tougher materials. To shift between High, Low or Reverse, simply push the single power-shift lever to the desired position. Hydraulic power in the constant mesh power-shift transmission makes any shift instantly, even when travelling. There's no clutch pedal, no engine clutch, no gear clash. And as any operator will tell you, *it sure beats riding a heavy clutch all day!*

Complete dust protection. The 12B is protected against dust and dirt in every conceivable way. An oil bath air cleaner filters the air which enters the main hydraulic reservoir. There is a filter for the torque converter oil and the power-shift transmission oil. A partial flow filter protects the engine lube oil. Transmission, torque converter, starting motor and generator are all dust-sealed. On the 12B, every precaution has been taken to avoid dust problems.

Make your own comparison. Neither words nor specifications can indicate the working superiority of the new MICHIGAN 12B. You've got to see it in action—see it handling your toughest job. Call your local MICHIGAN distributor or write us direct to arrange an on-the-job demonstration. The new 12B is available on a low cost, no-down-payment Lease Plan—ask for details. Whether you lease or buy the 12B, it will pay for itself faster than any Tractor Shovel you've ever seen. See it!

MICHIGAN is a trade-mark of Clark Equipment Co.

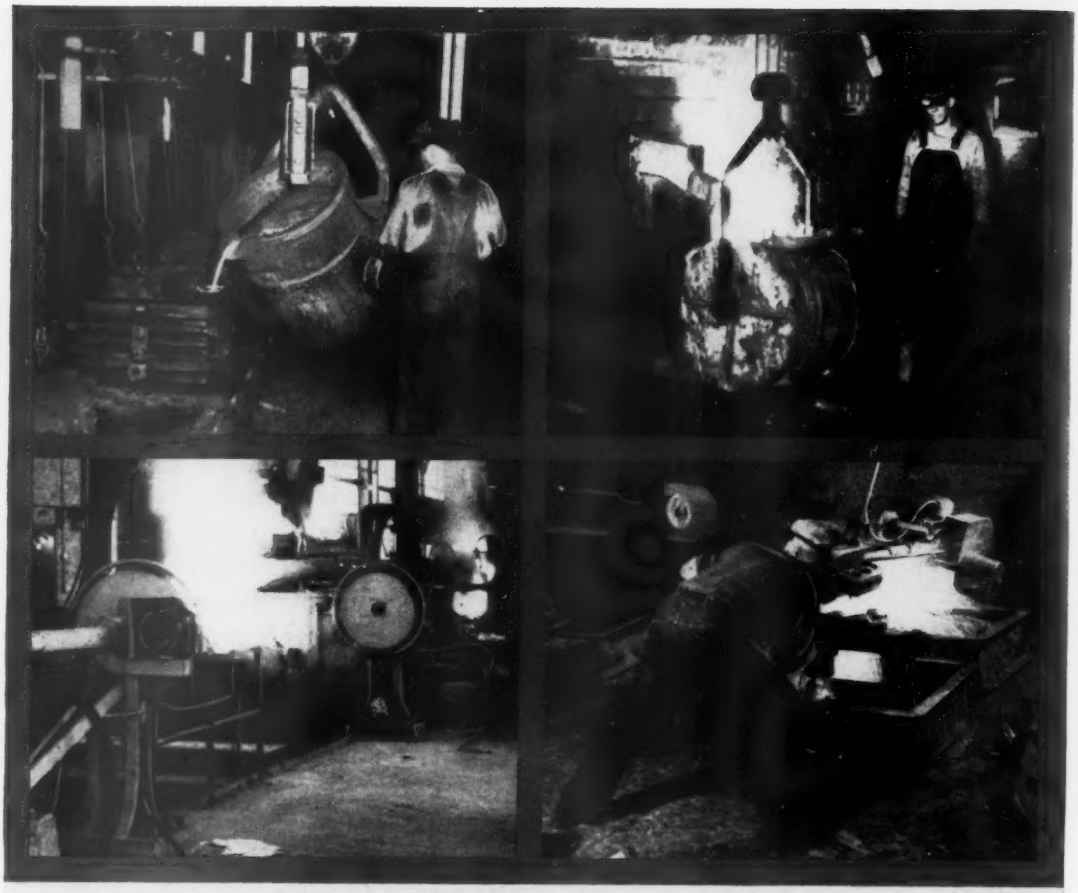
CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
442 Second Street
Benton Harbor 36, Michigan

Rugged bucket mechanism. The 12B's bucket mechanism is designed for strength and simplicity. There are no bell cranks; the boom and guide bar are straight members with fewer wearing parts. At 4 inches off the ground, you get 38 degrees tip-back. Positive "stops" on the bucket carrier provide clean dumping action.

A partial list of Knight clients

Acindar
Buenos Aires, Arg.
Acinfer
Villa Constitucion, Arg.
American Radiator & Standard Sanitary Corp.
Baltimore and Louisville
Appleton Electric Company
South Milwaukee, Wis.
B.I.F. Industries, Inc.
Providence, R.I.
Canadian Car and Foundry Company, Ltd.
Montreal, Quebec
Chrysler Corp.
New Orleans, La.
Combustion Engineering Inc.
Chattanooga, Tenn.
Crane Company
Chicago, Ill.
Dalton Foundries, Inc.
Warsaw, Indiana
Electric Steel Foundry Company
Portland, Ore.
Erie Malleable Iron Company
Erie, Pa.
Fahralloy Limited
Orillia, Ont.
Fairbanks, Morse & Company
Kansas City, Kan.
Ft. Pitt Steel Castings Division
McKeesport, Pa.
Hammond Brass Works
Hammond, Ind.
Haynes Stellite Company
Kokomo, Ind.
Macfarlane
Sagua la Grande, Cuba
Moline Malleable Iron Company
St. Charles, Ill.
National Roll & Steel Foundry
Avonmore, Pa.
Pittsburg Steel Foundry Corporation
Glassport, Pa.
Pyle-National Company
Chicago, Ill.
Sulzer Bros. Ltd.
Winterthur, Switzerland
Unitcast Corporation, Ltd.
Sherbrooke, Quebec
Universal Castings Corporation
Chicago, Ill.
Wagner Malleable Iron Company
Decatur, Ill.
Woodruff & Edwards, Inc.
Elgin, Ill.
Worthington Corporation
Harrison, N.J.



Whatever Casting You Produce... Whatever Your Foundry Problem...

Call on Knight Engineering Experience to Help Reduce Your Production Costs

Hundreds of successful foundry assignments have given Knight engineers and architects a practical working experience with every type of foundry—grey iron, steel, malleable, aluminum, magnesium, brass, bronze, armor, and allied products.

Knight Engineers have completed more than 500 successful assignments in such fields as:

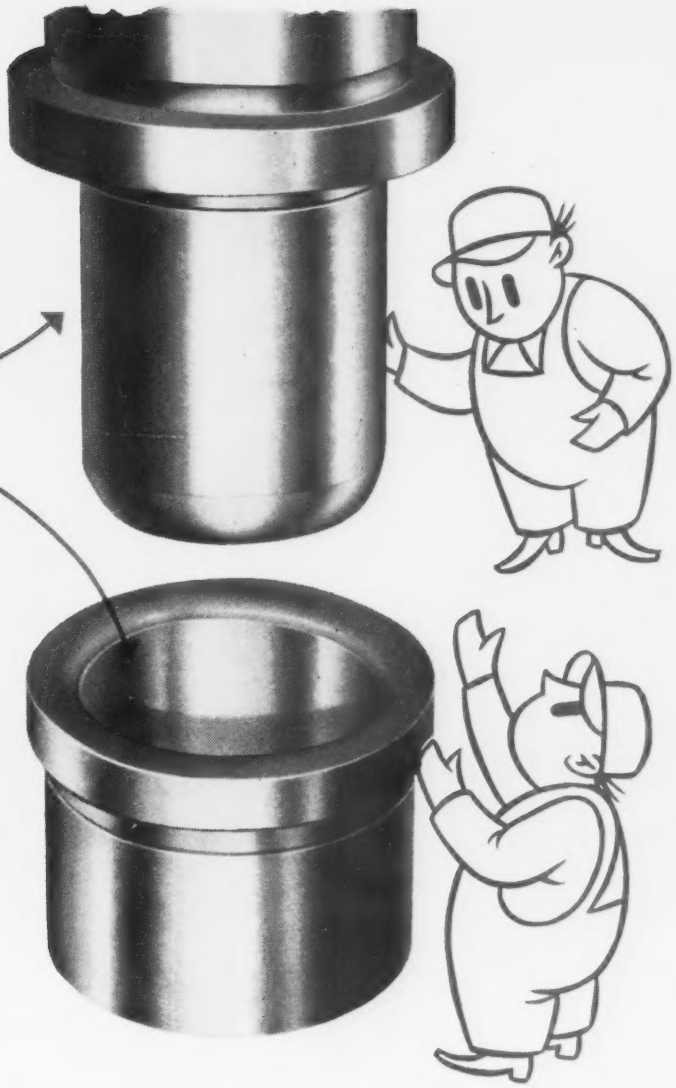
foundry engineering • architectural engineering • construction management • organization • management • industrial engineering • wage incentives • cost control • standard costs • flexible budgeting • production control • modernization • mechanization • methods • materials handling • automation • surveys

EVIDENCE OF EXPERIENCE

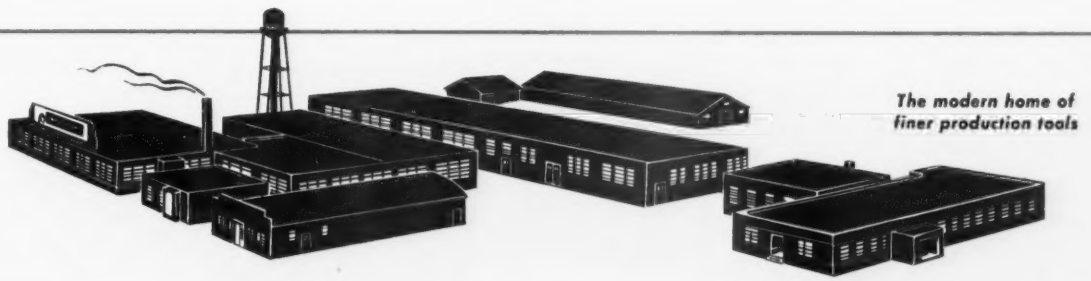
Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers
MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.
549 W. Randolph St., Chicago 6, Ill.
917 Fifteenth St., N. W., Washington, D. C.
New York Office—Lester B. Knight & Associates, 50 Church St., New York City 7

carburized and hardened steel wearing surfaces and ductile cores mean long life for UNIVERSAL flask pins and bushings



It's no easy trick to produce flask pins and bushings that are hard enough to take long, rigorous wear, and yet have cores ductile enough to resist breakage and rough treatment in the foundry. However, Universal has accomplished this difficult task. Universal flask bushings are double quenched and double drawn to produce a fine grain structure that will withstand considerable stress and strain without breaking or chipping. The wearing surfaces are carburized and hardened to reduce wear and prolong the life of both pin and bushing. Universal flask pins and bushings are precision ground to extremely close tolerances to insure instant, accurate alignment of cope and drag. Plain, taper and threaded series pins and bushings are available in a complete range of sizes as regular stock items. For complete information about Universal flask pins and bushings, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis. — or the home office.



The modern home of finer production tools

172

UNIVERSAL ENGINEERING COMPANY **FRANKENMUTH 4, MICHIGAN**

1
2
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"ENGINEERING, FABRICATION, INSTALLATION and COMPLETE SERVICE *from start to finish"*

Pacific Steel Casting Company

1333 SECOND STREET
Berkeley 10, California
TELEPHONE LANDSCAPE 8-0500

June 3, 1955

RECEIVED JUN 1955

Mr. M. J. Bell, President
Newaygo Engineering Company
Newaygo, Michigan

Dear Mr. Bell:

In December of 1954 your Company installed a sand handling system complete with shakeout, dust collecting and sand reclaiming equipment at this plant. This equipment has been in steady operation five days a week since that time and we have experienced no trouble of any kind with the equipment furnished by you.

The installation has enabled us to maintain uniform sand control. This has resulted not only in improved casting finish but also reduced cleaning room costs. Another factor is the improved working conditions in the plant due to the elimination of dust from our shakeout and sand handling operations.

At about the same time you installed two "Handy Sandy" Units to provide overhead sand for two molding stations. These Units have also operated perfectly and where we formerly required a four man crew we now operate with three men. This reduced crew is able to produce 25% more molds per hour. The result has been a substantial reduction in molding cost.

We also wish to compliment your Company on the excellent cooperation which we received from the planning stage to the completion of the installation. This is a real service to any company which is considering the installation of a sand handling system.

Very truly yours

J. D. Genger
Vice President,
In Charge of Operations

JDG:gb

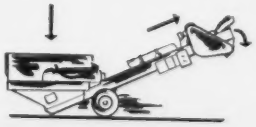
SELLS NEWAYGO to PACIFIC STEEL CASTING COMPANY

WESTERN REPRESENTATIVE
RUSSO FOUNDRY EQUIPMENT CO.
3882 Fairway Ave., Oakland 5, Calif.
Lockhaven 8-1303 or 8-1361

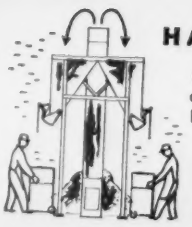
Exclusive Sales and Service Engineers covering the entire states of Arizona — California — Idaho — Montana — Nevada — Oregon — Washington and Utah. Also Alberta — British Columbia and Saskatchewan in Canada.

HANDY SANDY
puts sand overhead, eliminating shoveling for the molder.

REDDY SANDY



takes the hard work out of shakeout and sand preparation.



SUPER HANDY SANDY
a high capacity individual-floor sand handling unit.

A Copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire or phone today.

NEWAYGO engineering company
NEWAYGO, MICHIGAN

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

4 PROVEN REASONS*

why

Smooth, Reliable Hanna Cylinder Power is used on Machines and Equipment to Push, Pull, Lift, Press Clamp and Control

* 1 Increased Production at Lower Cost
2 Better Quality Control
3 Reduced Manual Effort
4 Dependable, Trouble-Free Operation

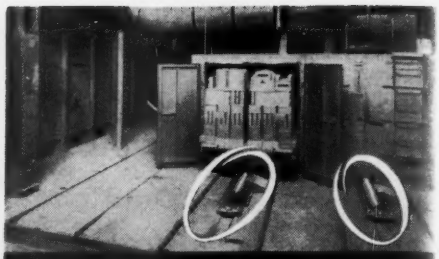
In thousands of plants . . . in hundreds of varied ways, Hanna Air and Hydraulic Cylinders are supplying power to actuate and control machines and equipment.

Daily, more and more design engineers, production and plant management men are applying Hanna Cylinder Power in new applications — for the reasons named above. And they recognize the need for the dependable performance that is built into *every* Hanna Cylinder.

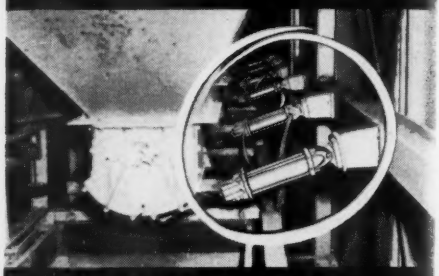
Check over the operations in your plant, the machines or equipment you build — you will probably find many applications where Hanna Cylinder Power will save time, reduce costs and help improve your product.

Hanna Engineering Works

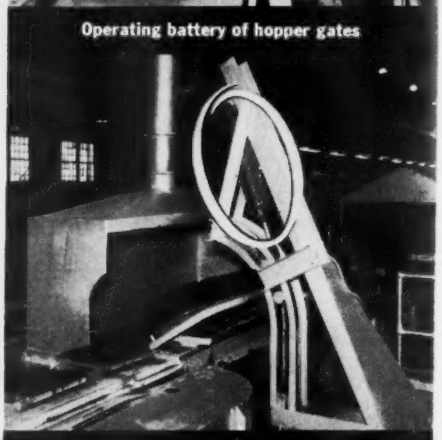
1772 ELSTON AVE. • CHICAGO 22, ILL.



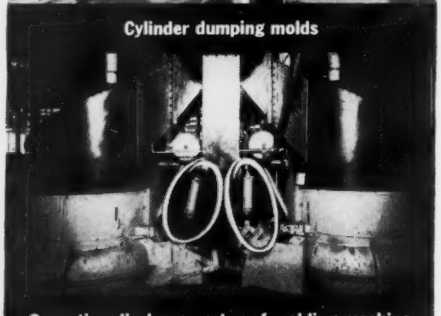
Material movement in and out of ovens



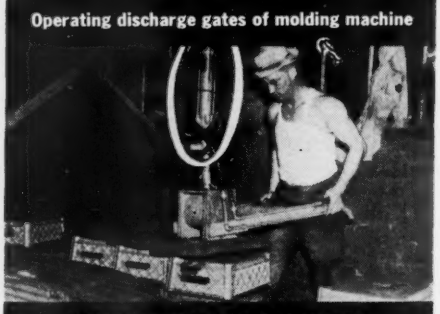
Operating battery of hopper gates



Cylinder dumping molds



Operating discharge gates of molding machine



Helping operator handle heavy units

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The Electric Furnace
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has proven its value in many foundries, including large automotive foundries.
Top foundry m nagers & cleaning room superintendents have found

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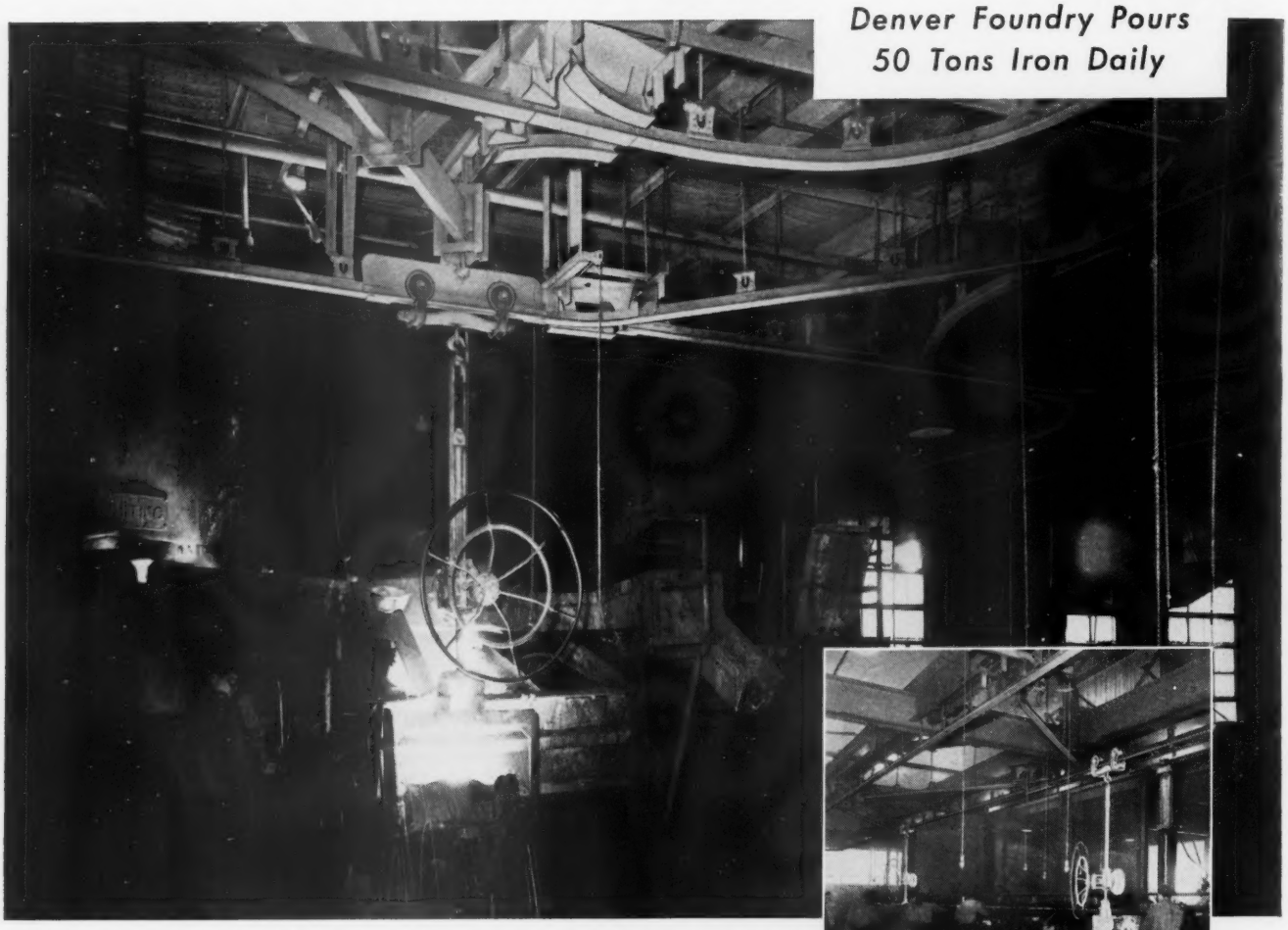
Denver Foundry Pours 50 Tons Iron Daily



▲ As illustrated here, Cleveland Tramrail can be readily installed to permit any material flow pattern and provide handling coverage exactly as desired. In a matter of seconds the ladle being filled here is on the pouring floor.

An overhead track loop serves the pouring floor. Several molds can be poured simultaneously and empty ladles returned to the cupola and filled ones moved in without interference because of the diagonal cross-over tracks from one side of the loop to the other. ▶

SINCE 1948 Cleveland Tramrail equipment consisting of cranes and an extensive track and switch system has played an important role in speeding production, cutting costs and aiding safety in the foundry division of the Electron Corp., Denver, Colorado.

50 tons of ductile and gray iron are poured per day in this continuous high-production foundry. Pouring ladles of 1000 and 1200 lb. capacity deliver the hot metal from either of the two cupolas directly to the molds, thereby keeping handling to a minimum and reducing heat loss. The overhead track arrangement permits unhampered two-way travel of the Tramrail ladle carriers, thus enabling uninterrupted production. After these years of hard, full-production service, one feature of the Tramrail equipment for which there has become a growing awareness is the extremely small amount of maintenance required.

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CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3839 East 286th Street Wickliffe, Ohio.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

REJECTS Make Dollar Profits Disappear

NATIONAL BENTONITE

Bonds Better to Prevent Rejects

All bentonites are not the same – and the difference between brands may spell the difference between profit and loss on your castings. That's why scores of foundrymen the nation over choose National Bentonite. The exceptionally high quality of this bentonite bonds better molds, helps measureably to prevent costly rejects.

National Bentonite provides exceptionally good green strength, higher hot strength, greater mold permeability, higher tensile strength and other characteristics – all which help eliminate the danger of casting blows, scabs, gas holes, and other defects that waste your money.

National Bentonite is mined from the purest, finest deposits of bentonite in the world. It is processed by the world's largest, most experienced producer of bentonite. National Bentonite is the finest money can buy. Use it and lower your reject loss.

Available from better foundry suppliers everywhere. Write today for specifications and prices.

Baroid

Baroid Division ☆ National Lead Company

Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

5024

"X-ray" view of wheel shows pronged anchor bushing and safety ring.

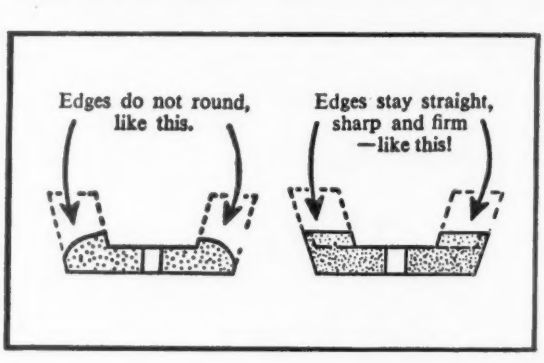
The fast, safe wheel for portable grinding!

The new U. S. ROYALITE HARD SHELL CUP WHEEL

The above cutaway drawing shows the safety secret of U. S. Royalite®: *the pronged anchor bushing and safety ring constitute a reinforcement that makes a safer and a smoother-running cup.* And Royalite's tougher rim keeps the edge sharp for the full life of the wheel. For today's lightweight portable grinders, this is the most economical, most efficient wheel.

EXTRA DIVIDEND: Remember that when you buy wheels from a United States Rubber Company salesman you are dealing *direct* and are being served by a specialist—a man whose only job is selling and *servicing* abrasive wheels. He will see that you get maximum value out of your abrasive wheel dollars.

Using a lightweight grinder equipped with a Royalite Hard Shell Cup Wheel to snag a grey iron man-hole cover casting. The combination of this grinder and the safer, smooth-running Royalite Wheel means a better job in less time—with less worker fatigue.



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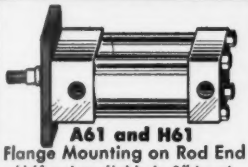
Miller AIR AND HYDRAULIC CYLINDERS AND BOOSTERS "IN STOCK" for immediate delivery.

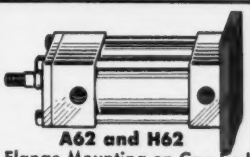
See Miller Bulletins A-105K(Air) and H-104K(Hydraulic) for Complete Dimensions and Engineering Data on these "in-stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 feet.

"IN-STOCK" MODELS

"A" Signifies Miller 200 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Red On Drawings.



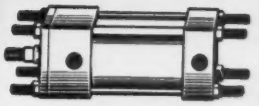
A61 and H61
Flange Mounting on Rod End
(A61 not available in 8" bore)



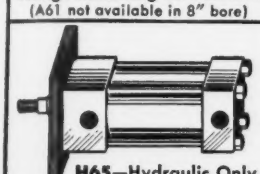
A62 and H62
Flange Mounting on Cap End
(A62 not available in 8" bore)

A63—8" Bore only
Flange Mounting on Rod End

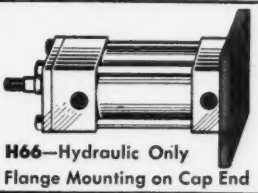
A64—8" Bore only
Flange Mounting on Cap End



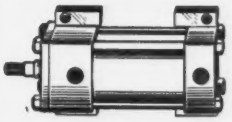
A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended. Cap End only.
A53 & H53—Tie Rods Extended. Rod End only.
A54 & H54—Two Tie Rods extended at both ends.



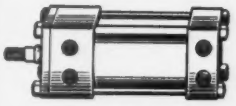
H65—Hydraulic Only
Flange Mounting on Rod End



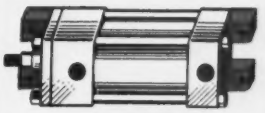
H66—Hydraulic Only
Flange Mounting on Cap End



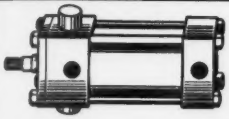
A72 and H72
Side Lug Mounting



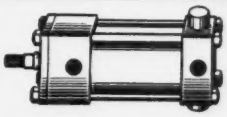
A74 and H74
Side Flush Mounting



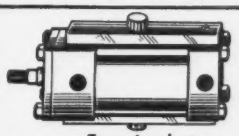
A77 and H77
Side or Foot Mounting



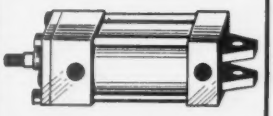
A81 and H81 Trunnion Mounting on Rod End



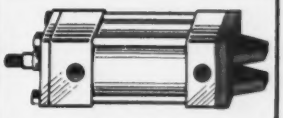
A82 and H82 Trunnion Mounting on Cap End



A83 and H83 Trunnion between Head and Cap
(one week delivery)



A84 and H84
Pivot Mounting



A86 and H86
Pivot Mounting

IN-STOCK BORES In Inches — "IN-STOCK" STROKES (in Inches)

	BORES	ROD DIA.	ROD TURN DOWN & THREADS		STROKES
AIR	1½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12
	2	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	6	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	8	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
HYDRAULIC	1½	⅝"	7/16-20	Cushioned	3 4 5 6 7 8 9 10 11 12
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12
	2	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	2½	1"	¾-16	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	3¼	1⅜"	1-14	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	4	1¾"	1¼-12	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
	5	2"	1½-12	Cushioned	3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36
				Non-Cush.	1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36

① "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

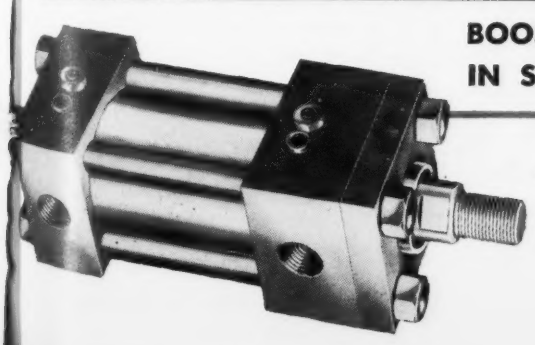
Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.



BOOSTERS IN STOCK

Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBA8, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.

Write For Catalog and Stock Price List

MILLER FLUID POWER CO.

Miller

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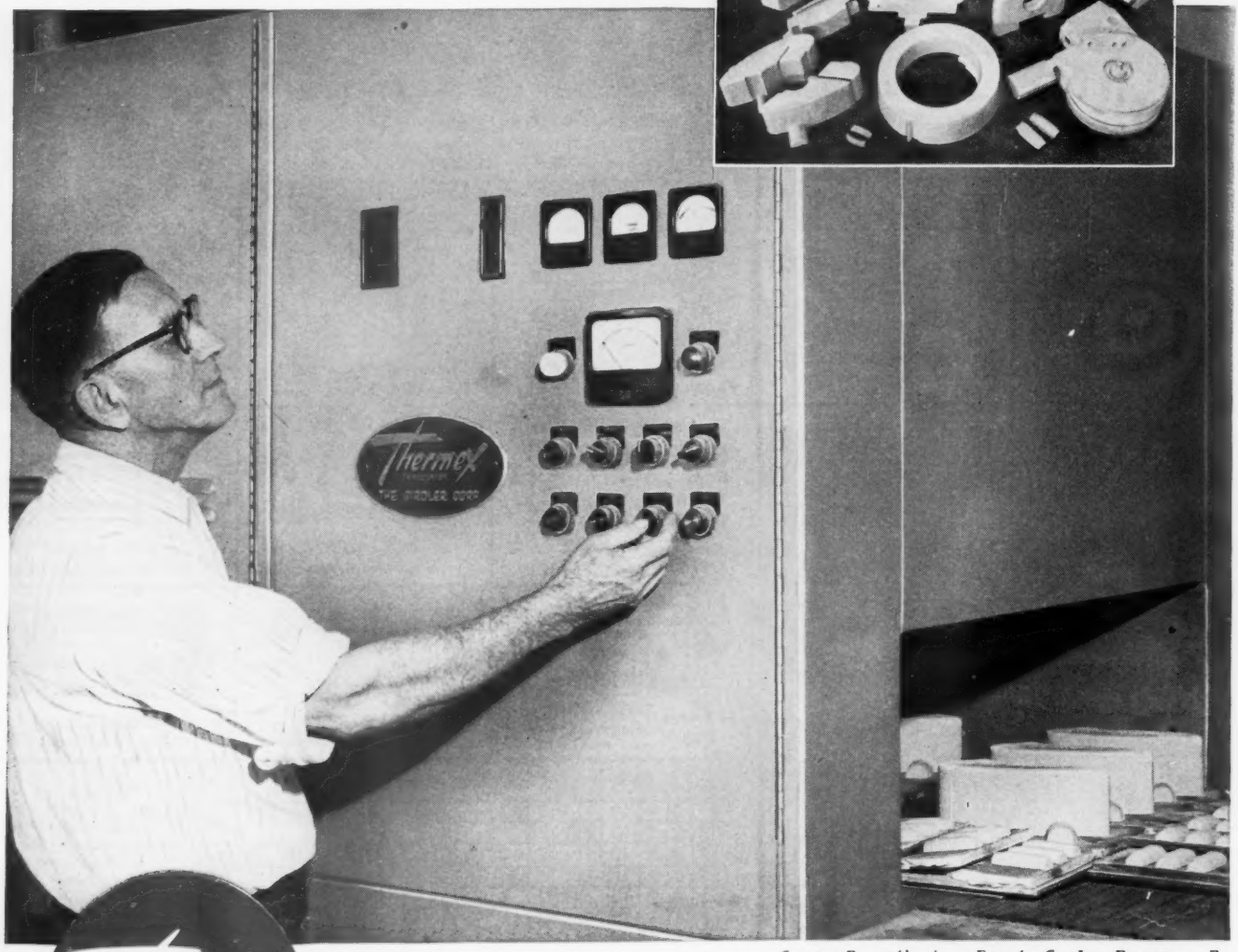
AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

33% MORE OUTPUT per core room manhour due to continuous baking with THERMEX Core Baking Equipment is the report from this aluminum foundry. Inset shows typical cores. Any or all can be baked at the same time . . . all uniformly regardless of size or shape.



Courtesy Boose Aluminum Foundry Co., Inc., Reamstown, Pa.

Thermex®
ELECTRONIC CORE-BAKING EQUIPMENT

How you reduce core rejects with this uniform baking

EVERY GRAIN OF SAND in the core gets the *proper amount of heat* with THERMEX* Core Baking Equipment. This uniform, rapid heat *avoids over-baking* of surfaces and thin sections and reduces dimensional changes. Castings are *more accurate* and have *smoother surfaces.*

Find out how you can improve your product, increase output per manhour, save core storage space, have a cleaner shop, and cut costs with THERMEX Core Baking Apparatus. Write for booklet. The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade-mark Reg. U. S. Pat. Off.

The GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

THERMEX DIVISION

Busy Foundry Gets High Speed, Better Sand Control, Lower Maintenance with PEKAY AIRATORS

Surge loads of 300 tons per hour of thoroughly aerated, fluffed, lump-free sand—with the belt running at 311 ft. per minute—that's the kind of day in and day out production RIVERSIDE FOUNDRY of Bettendorf, Iowa, is getting on their No. 1 PEKAY AIRATOR unit. Units No. 2 and 3 on Riverside's two other systems are performing with similar efficiency.

And if you ask Joseph Avdek, Riverside's Plant Engineer, he'll tell you that the installation of these PEKAY AIRATORS was easy, and took amazingly few man-hours—with no major changes necessary in his belt systems. Another point Mr. Avdek likes, besides the steady efficiency with which his AIRATORS turn out properly aerated sand, is the ease of inspection of all moving parts through the AIRATOR sideplates, and the low maintenance which is already helping him to show lower operating costs.

In addition, Mr. Avdek knows from PEKAY's records of numerous other AIRATOR installations in various parts of the country that he can expect exceptionally long life and much less frequent replacement of wearing parts with this compact but ruggedly built equipment. Any way *you* look at it, the AIRATOR can help you get rid of a lot of your sand-conditioning problems—and you'll be pleasantly surprised at how low your outlay will be!

You'll find PEKAY's better engineered, high-efficiency equipment in plants large and small all over the country—*Slurry Systems, Mixer-Mullers, Troff-O-Matic Conveyors, M-T-Matic Elevator Buckets,* as well as AIRATORS.

SEND FOR COMPLETE DETAILS TODAY!

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M-T-MATIC Elevator Conveyor Buckets
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Gentlemen:

Please send me details and price information on the PEKAY AIRATOR

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COMPANY _____

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702-3C
Fiberglas*
Welding Helmets

706-3C

These seamless all-plastic helmets are light, exceptionally strong, moisture proof, non-warping, heat resistant and easily sterilized. A new type "S" four position stop provides a strong, simple and quick adjustment for the individual wearer. No. 702-3C supplied with No. 1085 Insulated Steel Glass Holder. Includes Filterweld Plate and Clear Cover Plate. No. 706-3C has No. 1096 Insulated Dowmetal Lift-Front Glass Holder.

*Reg. T.M. Owens Corning Fiberglas Corp.

124SB-2
*Straightaway**
SOUND PROTECTORS

A real advance in muffling industrial noise. Increases efficiency, cuts compensable claims. Effective in both low and high frequency ranges. Headband type shown is for "on and off" or moderately lengthy use. Adjustable padded headband spring. "No-metal" connection unit. Designed so cups stay snugly, comfortably in place.

(Headband type with built-in earphones also available. Also helmet types)

*T.M. Reg. by David Clark Company

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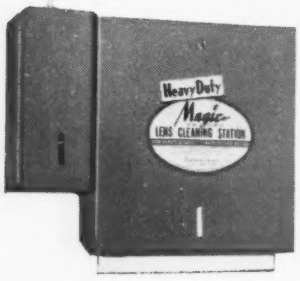
Quality Specialty Products Do the Job — Check Your Needs Today!

100C Safeticote Skin Protector and Cleaner

Cuts absenteeism due to dermatitis. Protects workers' skin all day — washes clean in a jiffy. Mildly antiseptic. Contains lanolin. For protection against cutting oils, lubricants, paints, etc. Available in jars and tubes.

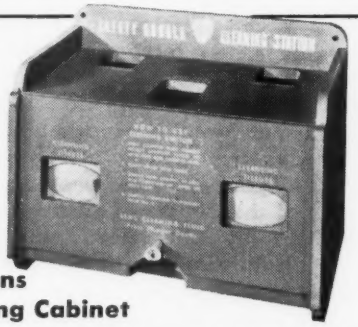


851 Heavy Duty Cleaning Station

For coal mines, foundries, packing houses, canneries. Use for plastic goggles, safety shields, any protective surface. Fluid is pressure packed. No pump, fuss or mess. Very economical in use. 20 gauge steel container. Pilfer-proof. Provides for tissue disposal. Unit consists of dispenser, cleaning and anti-fog fluid and jumbo size filling of paper.

850 Magic Lens Tissue (Silicone Treated) and Compact Dispenser

Steel dispenser can be installed on any smooth surface. The handy, thrifty way to keep glasses clean, clear, polished. Tissue is strongly tear-resistant, sheets are 50% larger than customary. Comes with 6 packages of tissues.



750 Lens Cleaning Cabinet

Wood. 12″ long, 9″ deep, 6″ high. Has all necessary cleansing and anti-fog materials. Simply attach to wall. Comes with 120 cleaning tissues, 1 oz. jar of AO Anti-Fog, 6 oz. bottle and sprayer. Order lens fluid separately.

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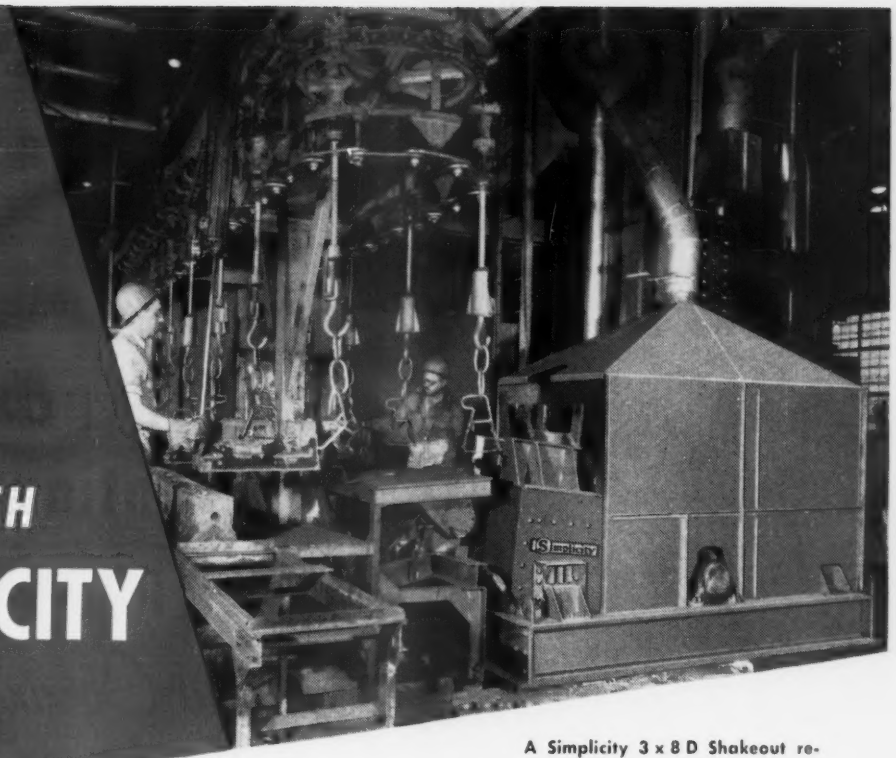
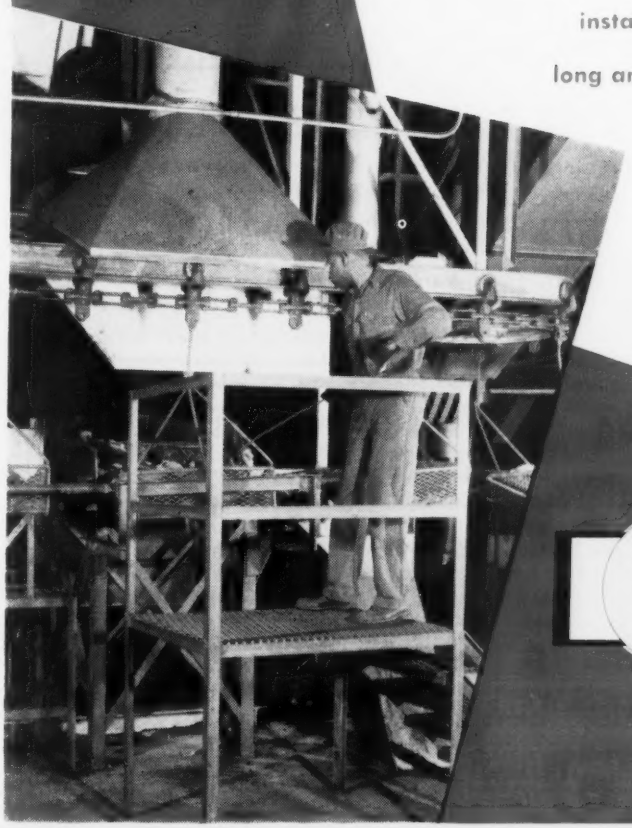
NEW, BIG AUTOMOTIVE GREY IRON FOUNDRY EQUIPPED WITH 39 SIMPLICITY UNITS



A Simplicity 3 x 8 D Shakeout removing shot at the new foundry.

Simplicity was called upon to supply thirty-nine units for this newest and finest of foundries. Included are 2 Simplicity Screens, 13 Simplicity Feeders, and 24 Simplicity Shakeouts. The history of all our previous foundry installations indicates that these thirty-nine units will have a long and trouble-free operating life. In this new foundry, as in so many other successful foundries, the SIMPLICITY equipment will help produce cleaner castings on faster schedules with reduced manpower.

A Simplicity 3 x 8 D shaking out sand cores.



If you have a problem with shakeouts, sand conditioning units, screens, feeders or similar units, call a Simplicity representative or write for catalog

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ENGINEERING COMPANY • DURAND 7, MICHIGAN

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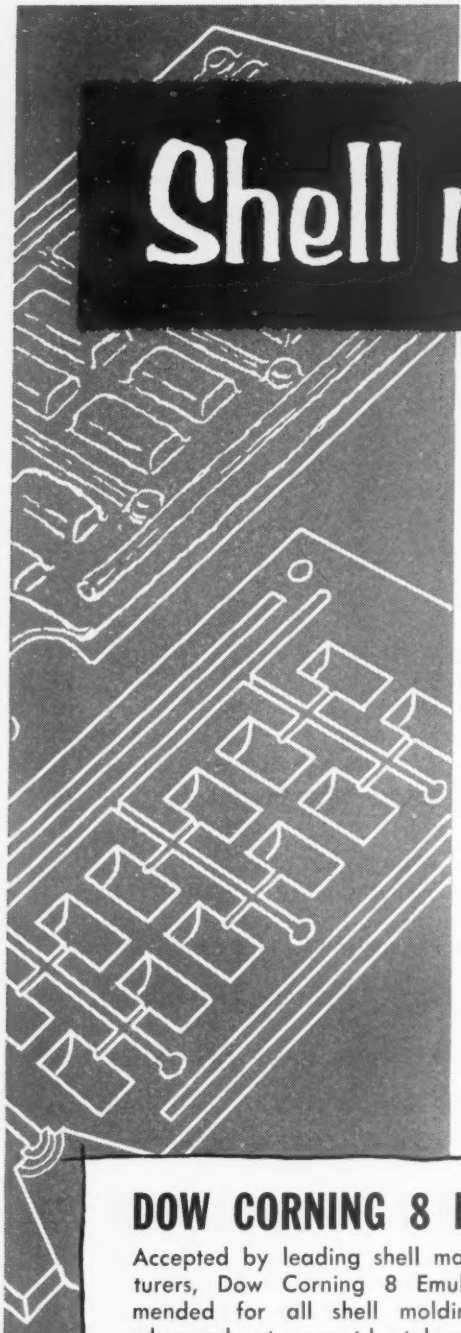
FOR EXPORT: Brown and Sites, 50 Church St., New York 7, N. Y.



Shell molders...

for fast, positive release more continuous production cleaner patterns, lower costs

use Dow Corning Silicone release agents

Shell molding is easier, more accurate and more economical when you use a Dow Corning SILICONE release agent. Especially developed for the metal casting industries, these silicone parting agents give you clean, easy release every time with little or no build-up on even the most complex patterns. Cleaning costs are minimized, and you obtain increased production of shells with uniform dimensional accuracy.

DOW CORNING 8 EMULSION

Accepted by leading shell machine manufacturers, Dow Corning 8 Emulsion is recommended for all shell molding applications where solvents cannot be tolerated. It is easily diluted in hard or soft water, resists creaming or separation—both after dilution and in storage, and is noncorrosive and nonflammable.

DOW CORNING 452 FLUID

A single application of this new solvent type silicone parting agent provides easy release for several resin-sand shells. Easily applied to either hot or cold patterns, Dow Corning 452 rapidly wets the surface and leaves a uniform silicone film that is both heat stable and oxidation resistant.

EXTRA for truly effective and lasting pattern break-in use convenient, ready-to-use ***Dow Corning 7 Compound.***

make your own test
mail coupon today for
free sample

Dow Corning Corporation, Dept. 5909,
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Please send me:

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- ☐ Free sample of Dow Corning 452 Fluid
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- ☐ Data on silicone release agents for the shell process.

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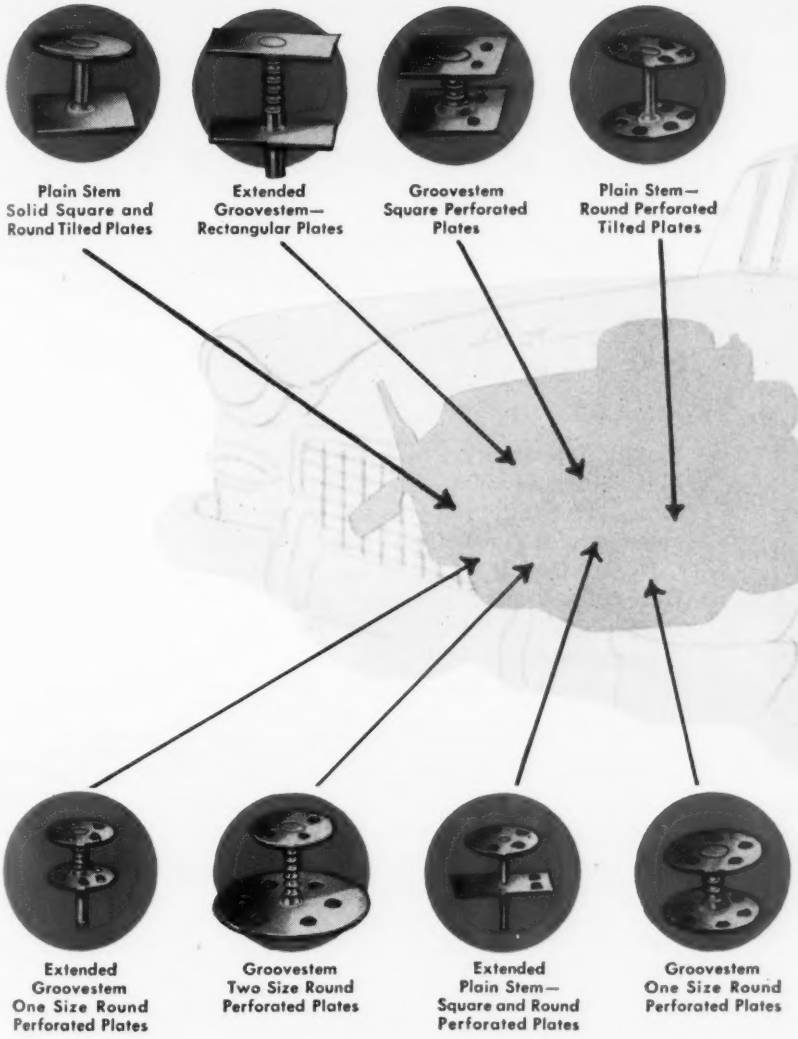
fine FANNER motor CHAPLETS

are used by more automotive manufacturers . . . in more locations . . . because of their outstanding record for producing sound, uniform castings



Products that are used by automobile manufacturers must pass the most rigid of tests. This is especially true of products involved in the casting operation because this industry depends on a gigantic continuous flow of uniform sound castings which form the heart of every motor car. Here, there can be no compromise with quality because unsound castings mean product failure and production line breakdowns. It is significant that for the past 30 years more fine Fanner Motor Chaplets have been used by more automotive manufacturers for more different castings than all other types combined. The millions upon millions of fine Fanner Motor Chaplets that have become an integral part of almost every motor car manufactured in the United States are proof of the close precision tolerances maintained, and the uniform high quality of these Fanner products. Fine Fanner Motor Chaplets through their exclusive design, their positive core support, their accuracy of construction, their complete fusion help produce better castings . . . at lower costs . . . with fewer losses . . . yet they cost no more! Only a few of the wide range of Motor Chaplets made by Fanner are shown —get acquainted with the complete line of Fine Fanner Chaplets by writing today for your free copy of the Fanner Chaplet Catalog.

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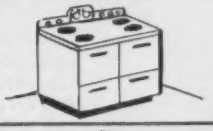
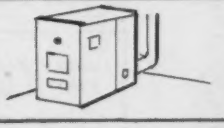
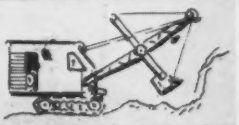
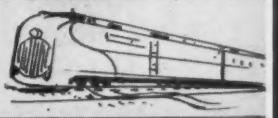
stoves	
furnaces	
road machinery	
locomotives	
farm machinery	

Delta Deburring Machines do a fast, high quality deburring and finishing job on castings. Delta Power Tools enable Meta-Mold to offer customers a complete machining and finishing service at "rock bottom prices."

Simultaneous reaming and flycutting of washing machine agitators is only one of the many machining operations Meta-Mold performs on Delta 17" Drill Presses. Note the Delta Slo-speed attachment (4.7 to 1 reduction) for precision reaming.

Delta Power Tool Division, Rockwell Manufacturing Co.
706-J N. Lexington Avenue, Pittsburgh 8, Pa.

☐ Please send Delta AB catalog, illustrating these and other Delta units.

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Meta-Mold's all-DELTA Shop

. . . CUTS FOUNDRY FINISHING COSTS

. . . MAKES PROFITABLE MACHINING SERVICE POSSIBLE

Making top-quality castings is only part of the job Meta-Mold Aluminum Company does for its customers. In addition, it offers a complete—and profitable—service in machining those castings.

Rockwell-built Delta Tools do the work. Delta Deburring Machines insure speed and quality of surface finishing—Delta Drill Presses provide fast, precision machining. Together, they make up a low cost machine shop that turns rough castings into finished parts, ready for assembly.

John Drydyk, superintendent, reports: "Our Delta Tools take a terrific beating, yet they hold their accuracy. That makes it possible to do a precision machining job to exact customer specifications. The high quality of work they turn out, plus their fast output, keeps our costs down and allows us to offer machining services at rock bottom prices."

In foundries from coast to coast, Delta Woodworking and Metalworking Power Tools are taking big bites out of the cost of pattern making, header removal, surface finishing and machining. Their ability to handle multiple jobs cuts handwork and set-up time—their accuracy eliminates rejects—their portability provides maximum foundry pattern shop flexibility. Let your Delta Dealer prove to you that Delta Power Tools, properly used, will pay you in lower costs—higher production. He's listed under "Tools" or "Machinery" in your classified phone book. Send the coupon for full information.

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ALUMI-PLATE*

pressure cast pattern equipment for your economical production

ACCURATE

DEPENDABLE

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Make ATLAS your source for aluminum plates, core boxes, cope and drags. Specialists in ALUMINUM and BRONZE PLATES for Shell Molding.

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SOLVE ALL YOUR CASTING PROBLEMS

Wherever metals are melted and cast, in foundries and refineries all over the world, FOSECO products are available to help produce the finest castings possible.

There is a FOSECO product for every casting need and for every type of metal. A complete range of *covering, protecting and refining fluxes, deoxidants, degassers, grain refiners, moldable exothermic compounds, riser covering compounds, mold, core and die dressings,* and many others . . . over 150 in all . . . make up the world renowned FOSECO family of casting products.

There are complete manufacturing plants in Canada, England, France, Germany, Italy, Austria, and South Africa as well as in the United States. FOSECO technical representatives are located in forty countries, in every section of the world. FOSECO is a far-reaching, solidly established organization which has been going about the business of improving castings and foundry practices for over a quarter century. This wealth of experience and knowledge, gained through research, development and activity in the foundry field means FOSECO products and service can solve all your casting problems.

Our plant, at Columbus, Ohio, has a highly trained group of technical representatives serving the entire nation. They are always available to help you with your casting and melting problems. The Canadian plant is located in Guelph, Ontario.

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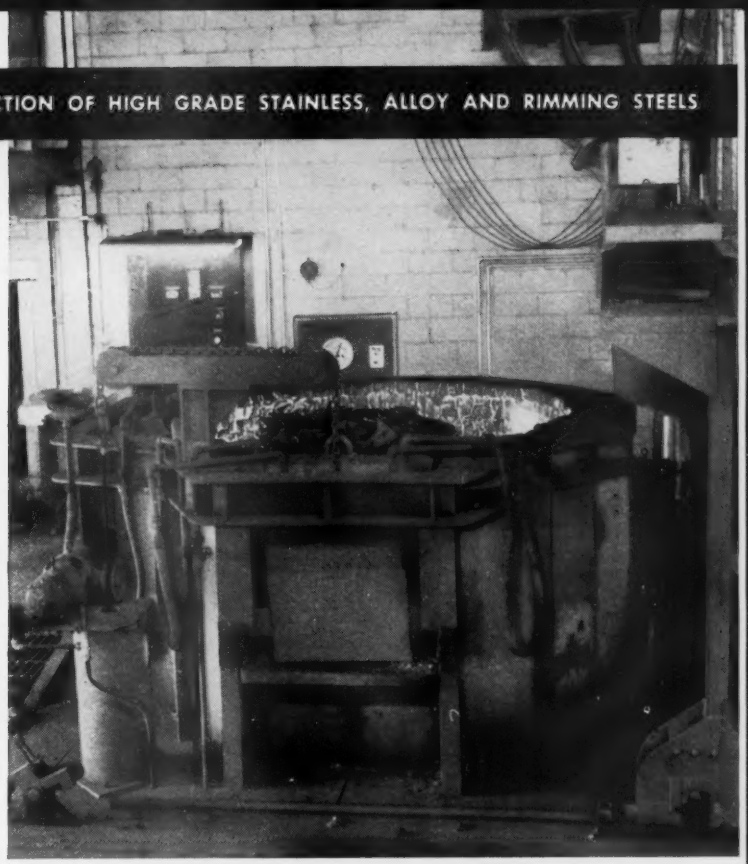
Heroult ELECTRIC MELTING FURNACES

TOPS FOR PRODUCTION OF HIGH GRADE STAINLESS, ALLOY AND RIMMING STEELS



--key to your modernization program--

To keep pace with your fast-moving industry . . . to produce better quality castings . . . faster, and more economically, it will pay you to consider the addition of electric furnaces to your existing metal-melting facilities.

In the light of the experience of some of the nation's leading foundries, Heroult Electric Melting Furnaces should easily prove a big time and labor saver, *and quality up-grader* for you.

Embodying the latest in mechanical and electrical equipment, these widely used furnaces are noted for efficient performance, and low operating and maintenance costs.

Heroult Electric Furnaces are available in foundry sizes of shell diameter from 7'0", and with rated charge capacity from 8000 lbs. up. They are usually equipped with roof-moving mechanism to permit top charging. Both gantry and swing-type roof moving mechanisms are available.

We welcome an opportunity to help you select and install the Heroult Electric Furnace best suited to your requirements.

Get This Catalog—IT'S FREE!

If you do not already have our catalog, we feel sure you will find it helpful in determining how the Heroult Electric Furnace can improve your foundry operation. If you will write the office nearest you, we will be pleased to send you a copy. No obligation.

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UNITED STATES STEEL

Shell molding in your future?

Shell cores are being used *more* and *more* in green sand molds. If shell molding is going to play a part in your foundry operations, now is the time to investigate the Nichols Sand Reclamation System. Nichols "Combination System"—wet scrubbing plus thermal processing—provides the only answer to effective, economical reclamation of shell sand—and conventional foundry sand.

To help you plan for the future and to guide our recommendation we maintain complete pilot plant facilities.

Write for Bulletin 222

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Sand Reclamation Systems

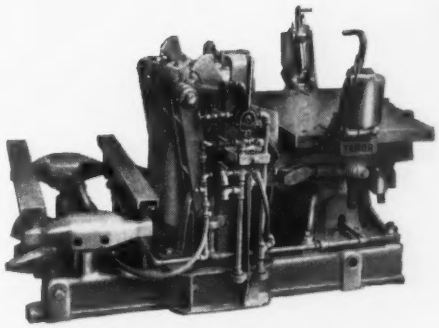
It's the low-cost producer who makes the market

IS IT better to have a market than a mill? . . .

Foundrymen are apt to take sides on this old question, but by and large the *low-cost producer* will make his own markets.

- He does it by producing a *better* casting *faster* . . . at *lower* unit cost.
- He does it on an individually planned *job basis*, without big capital investment.
- He does it by installing modern Tabor foundry machines — giving his men every possible means of eliminating lost production time.

Talk to a Tabor engineer today, or write for a catalog. You'll find it surprisingly easy to learn how you can have both a market *and* a mill.



22" TABOR ROLLOVER

Tabor Power Rollovers range from 450 lb. to 3000 lb. capacity . . . are supplied in portable-shockless or stationary-plain-jar types. Tabor's modern Rollovers give you up to 400% more castings than by floor molding — half again more castings than an obsolete molding machine can provide. The patented locking device for rollover plate and jar head — another product of Tabor's 70 years of foundry experience — ends plate wobble, eliminates secondary jolt, gives 25% more effectiveness to the jarring blow.

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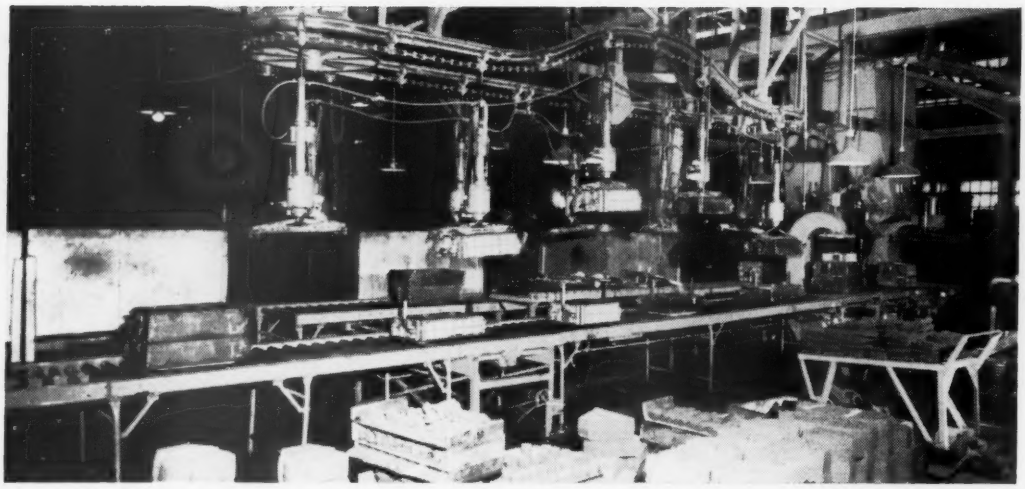

FROM MATCH PLATE PATTERNS

A "Fellows" Progressive Match Plate Molding Unit makes molds from match plate patterns in seven simple operations which are:

1. Assemble pattern and flask
2. Make drag
3. Make cope
4. Draw cope and pattern
5. Set cores
6. Inspect and close
7. Strip flask and transfer mold

Rolling over between making the drag and cope is performed mechanically without requiring any of the operator's time. The cope is drawn, conveyed to the closing station and closed mechanically. The cope conveyor is the pace setter because the speed of travel is adjusted to the required production rate.

SOME OF THE ADVANTAGES ARE:

Large molds made at maximum rate.
Fatigue is reduced to a minimum.
Unskilled men are trained quickly to perform the simple operations.
Machines are constructed simply to reduce maintenance.
Only one sand receiving point is required.
Removable or tight flasks can be used.
Existing patterns and flasks are used.
Floor space is conserved.

Let our engineers analyse your production problems for "Progressive Molding".

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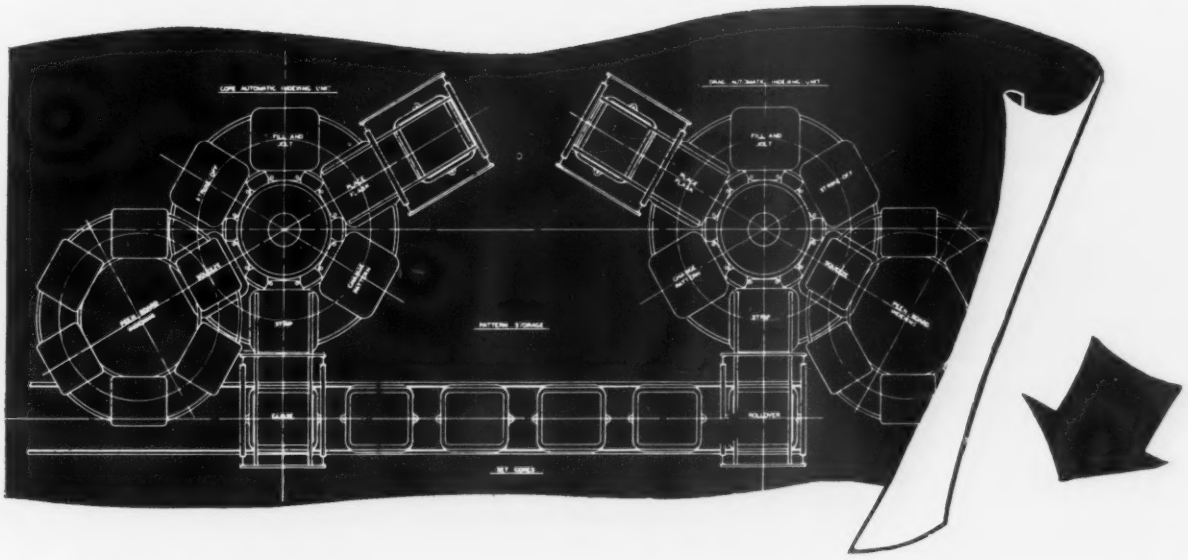
per man-hour

PROGRESSIVE MOLDING



FROM COPE and DRAG PATTERNS

for high production or miscellaneous short runs

A group of simple machines, each performing a single operation, is arranged in correct sequence to make molds from separate cope and drag patterns.

The machines can be arranged in line, in a square, or in a circle (as shown) depending upon the type of operation. Pattern changes can be made frequently without interfering with the other operations.

As much *automation* can be incorporated as can be justified. Molding units for "Progressive Molding" are practical from two stations manually controlled to six stations automatically controlled. Six different patterns can be run simultaneously, each mold being squeezed against a differene squeeze board.

Make an appointment for foundry installation operating demonstration.

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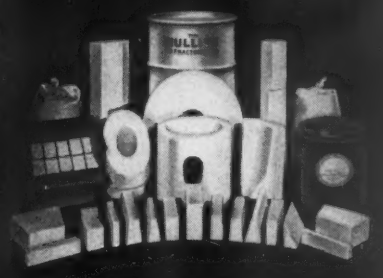

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Readers' Comment

Cost System Requirements

TO THE EDITORS:

Because of the work in which we are engaged, we were particularly interested in the first question and answer on page 136 of the July 1955 issue. This was the question in which operators of a gray iron foundry asked about a plan for determining cost. In regard to this we would like to make some additional comments.

We are in 100 per cent agreement with the answer as given in FOUNDRY. However, there are certain things we know from experience:

1. Few companies have the personnel capable of making a new installation.
2. Most people find it difficult to give up the old method for a new one.
3. Daily routine work gives them little time for doing it.

C. E. WESTOVER
Westover Engineers
3110 W. Fond du Lac Ave.
Milwaukee 10

* * *

Crucible Furnace Advantages

TO THE EDITORS:

I have just caught up with the "Troubleshooting" feature as published in the May 1955 issue, so you see I am a little behind in my reading.

In the correspondence featured in that department you will recall that "Sam" wrote that he was operating two homemade crucible furnaces melting aluminum for permanent mold work and asked if he could build a small dip-out gas fired furnace for this purpose and you have given him instructions on how to build a small open-flame or reverberatory furnace.

Since in the letters both you and "Sam" agree that factory built equipment is much better than homemade, the same comment would apply to crucible furnaces as to open flame furnaces, but your letter omits any reference to such equipment.

Considering the number of dip-out crucible furnaces for permanent mold and die casting work that are in operation in some of the best foundries in the country, I believe "Sam" would be better advised to purchase such a furnace from one of the regular manufacturers, some of whom advertise in FOUNDRY.

There is always a refractory problem with the open-flame furnace, and particularly when melting aluminum a fire brick lining is difficult to keep free of dross and is subject to penetration by both the aluminum and aluminum oxide.

The crucible furnace set with a clay bonded or carbon bonded crucible is easy to keep clean on the inside, and replacement of the crucible is much easier than relining an open-flame furnace.

If capital is not available, I think "Sam" will have a lot less trouble if he sticks with his crucible furnaces even if homemade, and it might be possible to improve these furnaces much more easily, if necessary, than to start out and build a furnace of the open-flame type with whose construction and operation your correspondent obviously is unfamiliar.

RICHARD H. STONE
Sales Manager
Vesuvius Crucible Co.
Pittsburgh 18

* * *

Common Apprentice Problems

TO THE EDITORS:

I wish to tell you that I have received a number of letters about my article, "Related Information for Foundry Apprentices," published in February FOUNDRY. One of these was from the Stanton Iron Works Ltd. of Nottingham, England. The problem of apprentices and their training there is the same as in this country. They wish to try to use the workbooks described in the article. I was most happy to tell them how and where to obtain those books.

The foundrymen in this area were very pleased that the article was published by you and I am sure that you will hear from them.

MAURICE C. SANDES
Division of Apprenticeship Standards
State of California
Oakland, Calif.

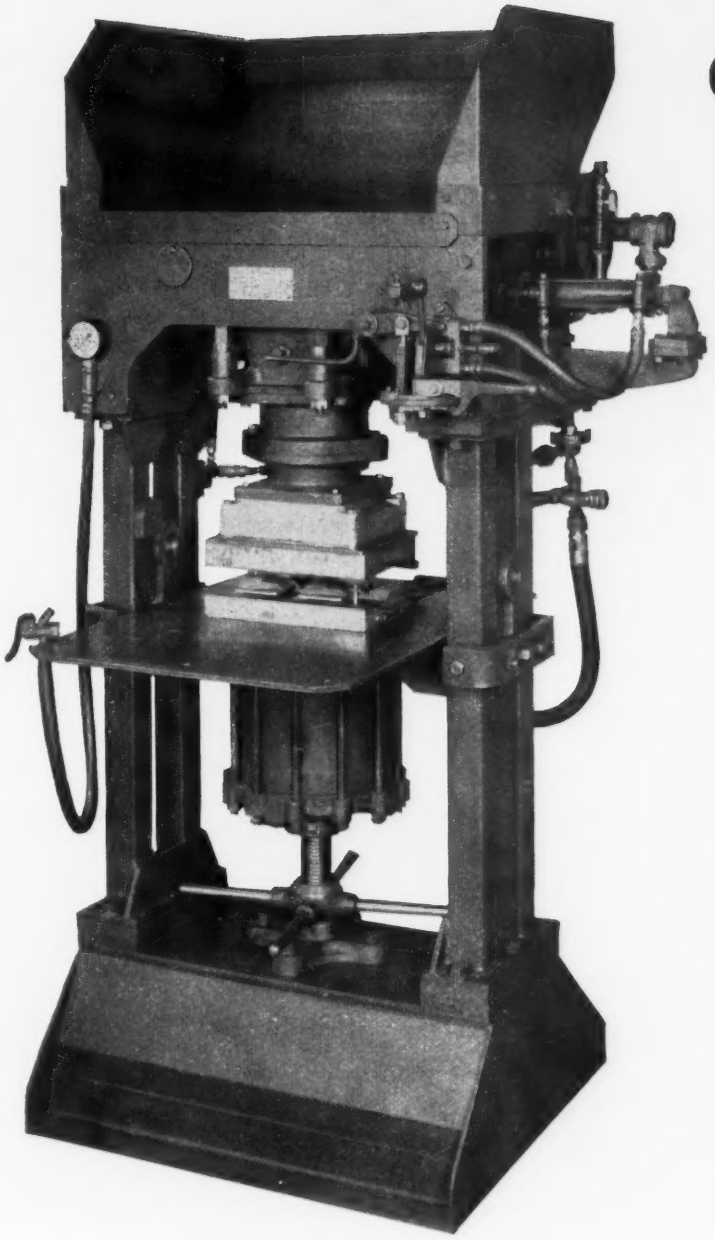
* * *

Some of the Foundry Pioneers

I was much interested in your story on page 12 of the July FOUNDRY of the record of Mr. Licau, of Allis-Chalmers, Milwaukee. I have in mind only one patternmaker who had a comparable record of service. I refer to Mr. Hugh Howat, who died 12 years ago at the age of 92. He was busy in the patternshop and foundry until a few days before he passed away.

Mr. Howat was born in 1851 and began his apprenticeship in 1864 at a time when a boy beginning pattern-making often had to spend a year in a foundry. He finished his five years of apprenticeship with one year in the foundry and four years in the patternshop in 1869. He therefore spent 74 years at his trade after be-

Redford No. 4-D DRAW TYPE CORE BLOWER



Designed primarily to fill the need for a fast and flexible draw type machine to handle work from a few ounces to 10 lbs., the Redford #4-D can be quickly adjusted to accommodate core boxes not requiring the draw feature, or can be equipped with a clamp to handle vertically parted core boxes.

Rugged construction, simplicity of change-overs and a fast operating cycle make it suitable for either jobbing or high production work.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

The stationary sand magazine and accurately guided draw table assure perfect drawing of the cores. Vibration of the core box is automatic.

Magazine heads normally furnished with the #2 Redford machine can be used with the #4-D Redford. Larger new type magazine heads especially suited for draw type work are also available as standard equipment.

Valves are designed to assure maximum safety. The operator must use both hands at the same time in order to clamp the core box.

The Redford #4-D has been thoroughly proven in both small and large foundries. To get complete information write for Bulletin 4-D.

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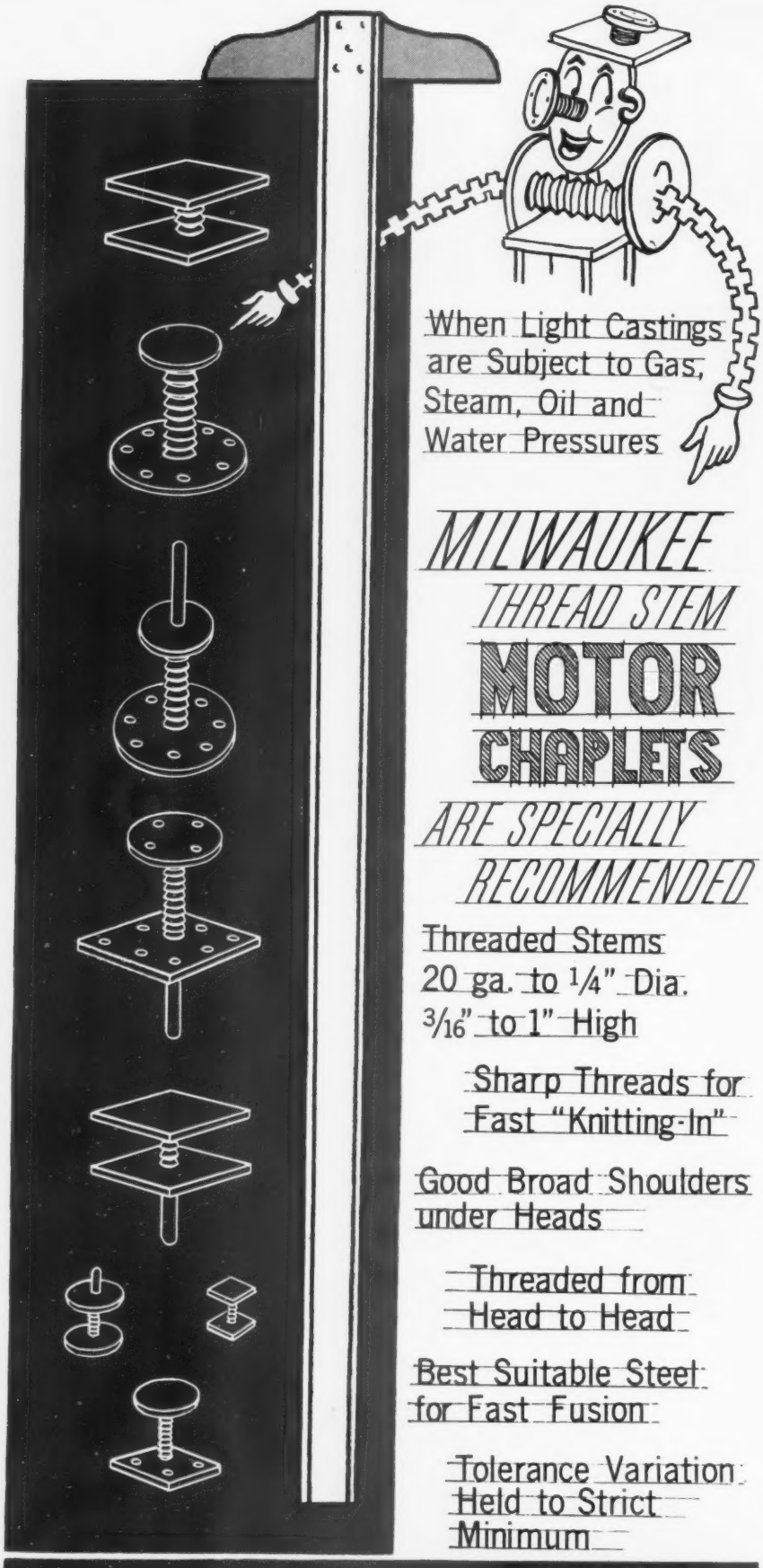
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ing made journeyman, and 79 years if we count his five years of apprenticeship beginning at age 13.

In the late 70's he was foreman patternmaker for an American firm which began a foundry and machine shop in Coatbridge, Scotland, for the manufacture of sugar and rice processing machinery. Later on he worked all over Scotland and Ireland. His last place of employment was the Excelsior Iron Works, Wishaw, Scotland, where he was in charge of the patternshop and foundry for 40 years.

He was an expert woodworker and could even make a violin that any violinist would not be ashamed to play. He was always experimenting with sands, cupolas and the like. And he had a great deal of correspondence with the pioneers of technical education in the U.S.A.—men like Simpson Roland, Robert Emmett Masters, T. D. West, and Joshua Rose. These pioneers all sent their books to him.

Mr. Rose was born in 1849 and died in 1891. He published his first book in 1876. The other three gentlemen named were active in about the same period as Mr. Rose. All of them died many years ago.

Mr. Masters, who was a pioneer in adding steel to a cupola charge in the late 70's and early 80's, died many years ago at San Diego, Calif. Mr. West died some years ago in Cleveland, where his grandsons still carry on the steel foundry he founded in 1915. All of these men contributed articles to *American Machinist* and *Scientific American* before the late John Penton first published FOUNDRY in 1892.

E. R. WATERMAN
1101 *Church St.*
San Francisco

* * *

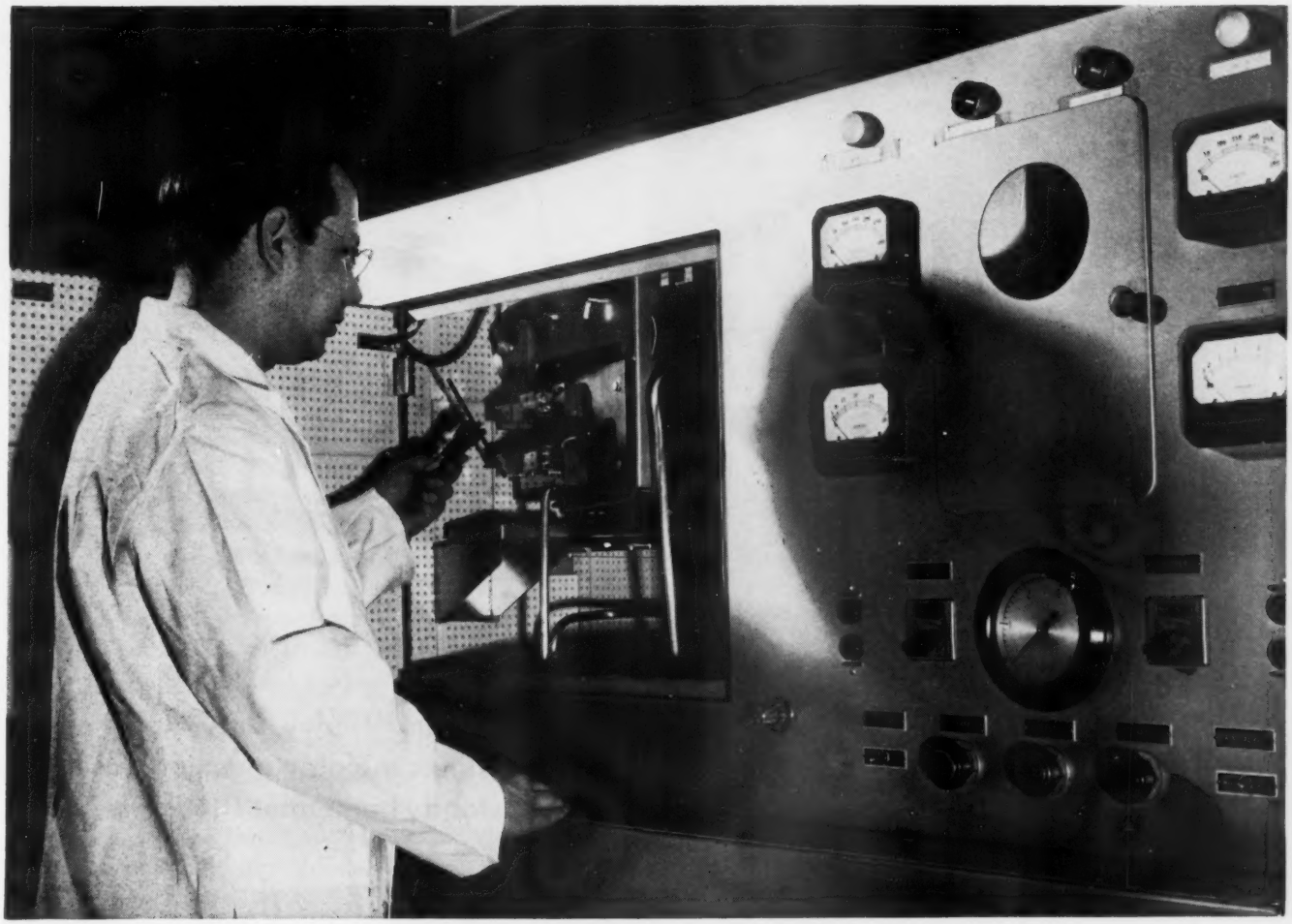
Engineers and the Foundry

TO THE EDITORS:

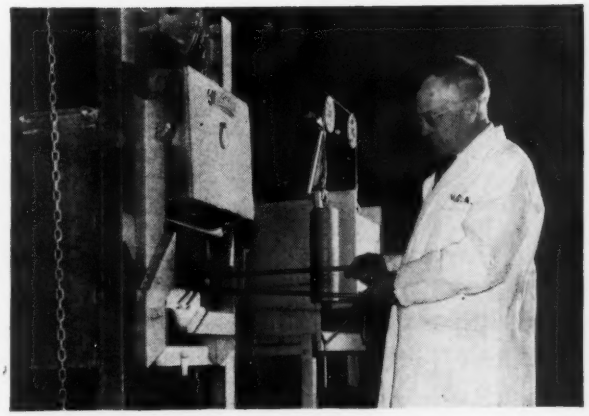
As you say in your editorial, July issue, "Increasing numbers of young engineers are finding opportunities in the field of castings production." This is also true of the many industries such as ours which go along step in step with production foundries and provide them with many new accessories and helps not on their own programs.

In our case, L. M. Johns, who ably serves as manager of installation and maintenance on all Pangborn equipment, has found that he is using more and more college-trained men in this field, and the results in savings are beginning to assume substantial shapes to the users of our type of equipment.

A. LESLEY GARDNER
Advertising Manager
Pangborn Corp.
Hagerstown, Md.



This man wants to help you...



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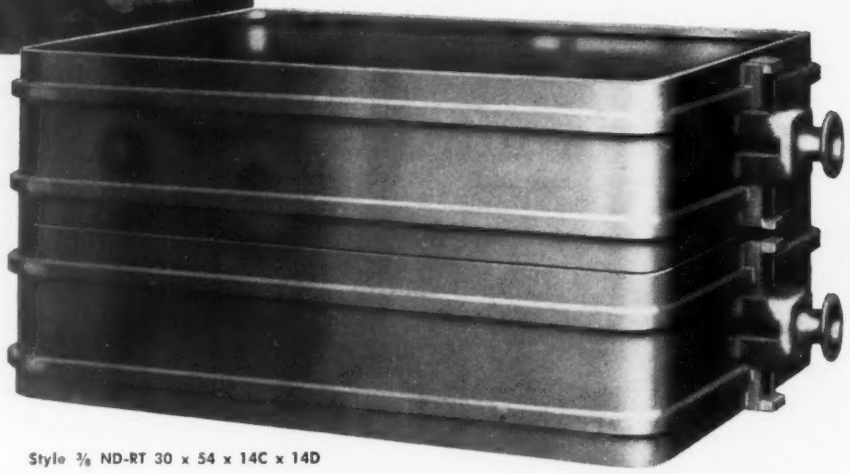

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Dirty but Interesting

The other evening I was on a train going into one of our major foundry centers. Just by chance I was looking through a copy of this publication. A fine looking young fellow of high school age in the seat across the aisle looked over and said, "You're reading FOUNDRY. I know about that magazine because I took a course in foundry at Tech and my teacher had us prepare written reports from material in FOUNDRY." Of course I was extremely pleased to know that the publication is being used in that manner.

Then the young man made a thought-provoking statement. "While it was dirty, the work was interesting and most of us enjoyed it a lot." Regardless of the fun he had in making things out of metal, the factor of dirt remained in his mind. Interesting—but dirty.

And then I got to thinking about some of the school foundries I have seen. In too many, any available equipment is obsolete if not completely antiquated. Necessary materials frequently are short in quantity as well as quality and therefore must be utilized longer than should be necessary.

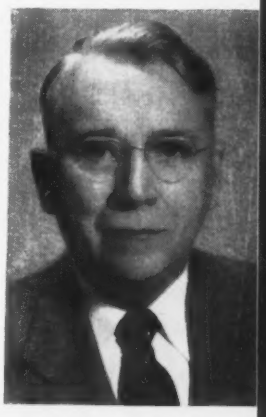
On the other hand, the teachers in most schools are fine, conscientious men having a knowledge and background of foundry practice and an eagerness to give the boys some of the basic fundamentals of casting production. They are handicapped by conditions under which they operate.

It is from these schools that many foundries must get their future workers. It is in these schools that many boys get an idea of the operations performed in the plants where their fathers work. And if their reactions are similar to that of the young lad on the train, these young people get an idea of poor working conditions in our industry.

Isn't it time for top management in foundries to take a good look at the high school and trade school foundries in the community? Isn't it time to find out what is being taught and appraise the tools with which this teaching is done?

September brings the opening of school. Why not take a look at your school foundry? And if it needs help, why not get the foundries in the area interested in a project that will provide better facilities and methods in school foundries.

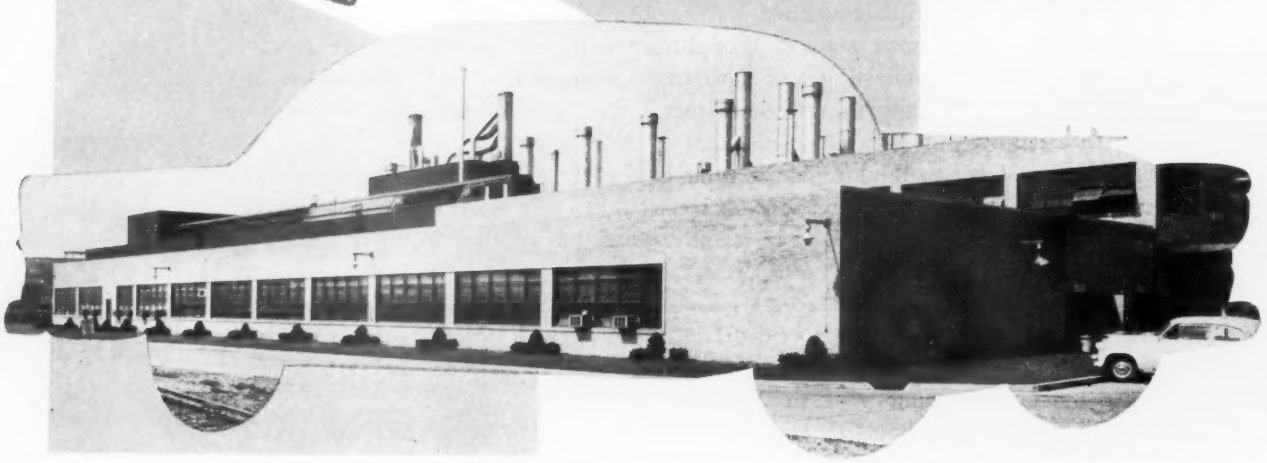
Let's put our best foot forward in telling these young people how castings are made.



Frank G. Steinbach

Editor

CHEVROLET TONAWANDA FOUNDRY



Chevrolet's main foundry building at Tonawanda, N. Y., contains 279,958 sq ft of floor area. It and several smaller buildings house the entire operation on 155 acres of land

THE new foundry of Chevrolet Motor Division of General Motors Corp. at Tonawanda, N. Y., is pouring 1000 tons of gray iron every 16-hr day into component castings for 3520 V-8 and six-cylinder engines. These castings are machined in the adjoining engine plant located on the company's 155-acre site. Total foundry employment is about 2000, and production is continuous over two 8-hr shifts.

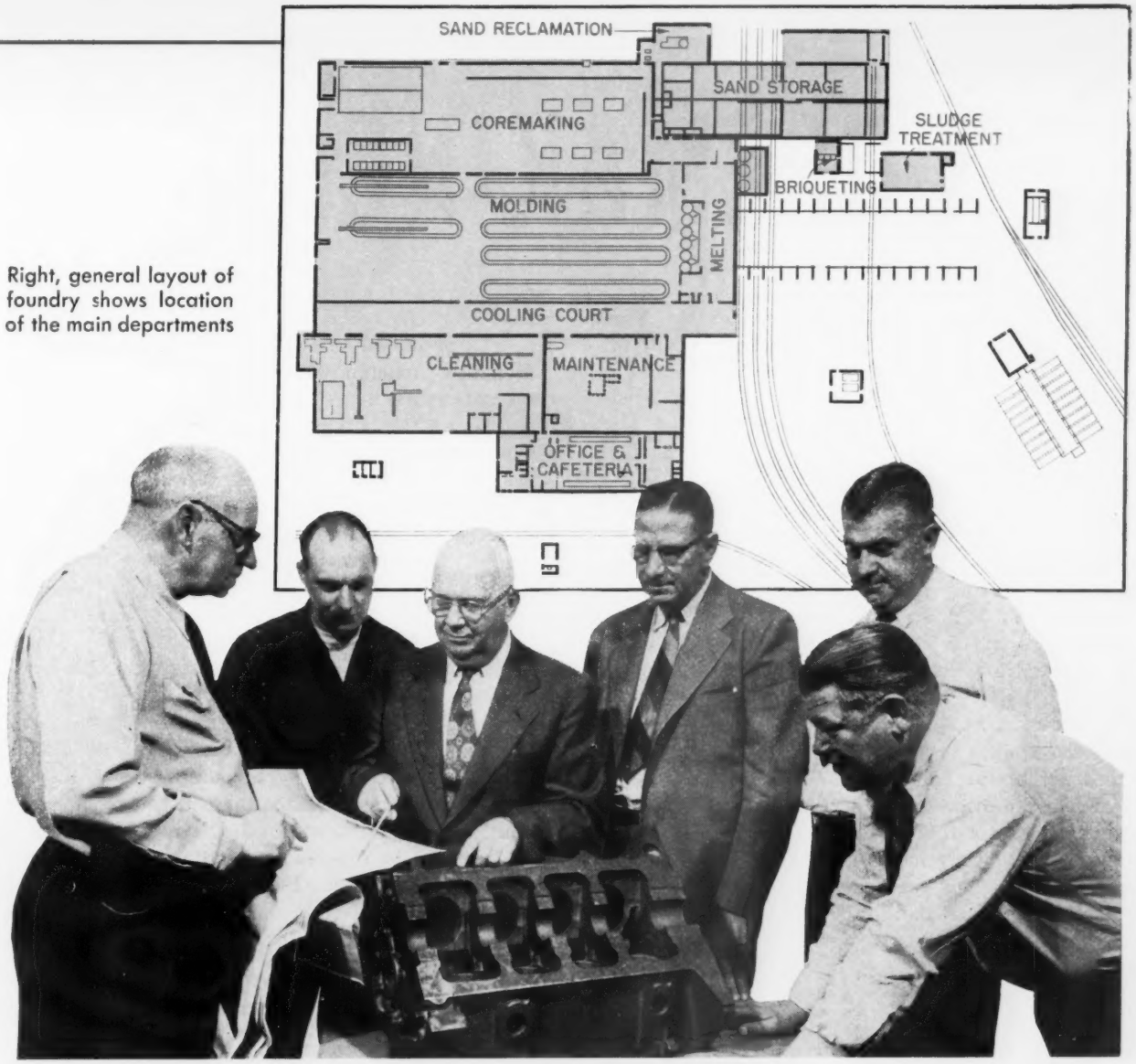
Facilities are contained in a large main building containing 279,958 sq ft of floor area and in several smaller buildings. The latter house briquetting equipment, sludge treatment tanks, fuel oil pumping equipment, pumps for core oil, kerosene and gasoline, acetylene generator and a sprue mill. Other units include a power house containing boilers and air compressors, and an electrical substation.

The main building is devoted to molding, coremaking, patternmaking and maintenance, casting cleaning, sand storage and melting operation. In addition, offices, the cafeteria and dining room, sand laboratory, first-aid room, locker rooms for men and women, and various storerooms are located in this building. A basement underlies the foundry department, office and cafeteria and part of the core and cleaning rooms.

Sand Storage—About 25,000 tons of sand is stored in this 20,675-sq-ft building area, which is divided into bins for segregation purposes. Railroad cars enter the room to be unloaded with clamshell buckets. Wet and dry new sand as well as reclaimed sand are stored.

Coremaking—The coreroom covers 81,480 sq ft of floor space and is equipped with 42 coremaking machines, 11 continuous baking ovens, 16 batch baking ovens and seven core wash and paste drying ovens. Six, 4000-lb capacity, hand-controlled mullers prepare the sand, which is delivered to coremaking machine hoppers either by lorry car or a distribution belt. New and reclaimed sand is used. Both are dried before use. Sand processed in the 15-ton-per-hour wet-type reclamation unit comes from floor sweepings and the cleaning room.

Right, general layout of foundry shows location of the main departments



Chevrolet's foundry management personnel. Left to right: R. D. Pugh, general foreman, pattern shop; J. J. Flynn, superintendent, inspection; A. A. Way, manager of Tonawanda plants; Clarence Qualman, foundry operations manager; J. H. Hubble, superintendent of production, first shift, and G. F. Hilman, superintendent of production, second shift

Molding—Six car conveyor molding loops and a jobbing floor for miscellaneous and repair castings occupy 83,170 sq ft of floor area. The department is equipped with 68 molding machines and 18 machines for making green sand cores. Four of the loops have independent sand systems; a fifth system serves the remaining two loops. The systems employ continuous sand mixers, and sand properties are maintained by seacoal and binder additions in a slurry prepared at a central station. Pouring and shakeout areas are exhausted to dust collectors, and casting cooling tunnels are ventilated. Castings are moved by overhead monorail conveyors to the cleaning department.

Melting—Six cupolas, each with capacity of 30 tons per hour, are operated in groups of three on alternate days. They are continuous slagging, intermittent tapping, hot-blast units. Cupola effluent gases go through vortex collectors to prevent atmosphere contamination. Weigh-type equipment charges metals on one side of the cupola and coke and limestone on the other side. Slag is carried away by a sluice system and metal is tapped to seven, 1-ton capacity monorail carriers.

Cleaning—The cleaning room contains 52 tumbling mills, seven blast units, special fixture grinders, several hand grinders and chipping hammers and welding facilities. Blocks and heads are blast cleaned, then placed in fixtures for grinding in the special units. Smaller parts are tumbled and blasted. All castings are touched up with hand grinders and chippers. Conveyors and electric trucks are used for moving castings in straight line processing sequence.

Pattern and Maintenance Shops—Facilities for making and repairing wood and metal patterns are housed in a modern, well-equipped shop on the second floor of the main building. The room occupies about 22,000 sq ft. The maintenance shop, underneath the pattern room, contains machine tools, welding units and battery chargers for keeping production and material handling equipment in working order. About 24,000 sq ft are devoted to this function.

COREMAKING

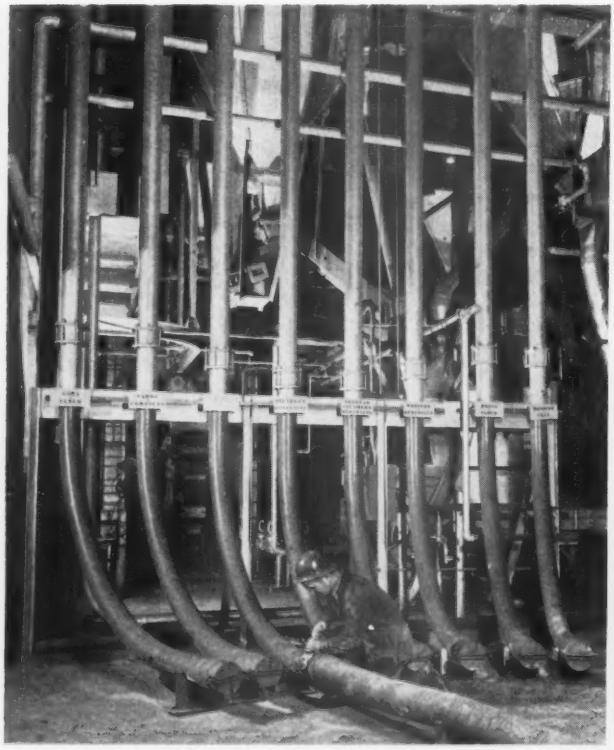
COREMAKING facilities in the Chevrolet Tonawanda Foundry include two straight flow production lines equipped with six double-end automatic coreblowing machines served by two overhead, horizontal drying ovens. In addition, there are 36 semiautomatic coreblowers arranged in groups of four around nine tower ovens.

Sand is stored in a section of the building divided into large open-top bins by cement walls. Total sand storage is 25,000 tons. New sand brought into the building in gondola cars is unloaded by clamshell buckets carried by two bridge cranes. When not occupied with unloading cars, the cranes bring sand from storage bins to hoppers at one end of the room. Sand is conveyed from these hoppers to a rotating, oil-fired cylindrical drier-cooler with capacity of 30 tons per hr for lake sand and 20 tons per hr for bank sand.

From the drier-cooler, screened sand is raised by bucket elevator to a 24-in. distribution belt. Hand-operated plows remove sand from the belt into muller storage hoppers or into two large storage bins forming part of the main sand storage area.

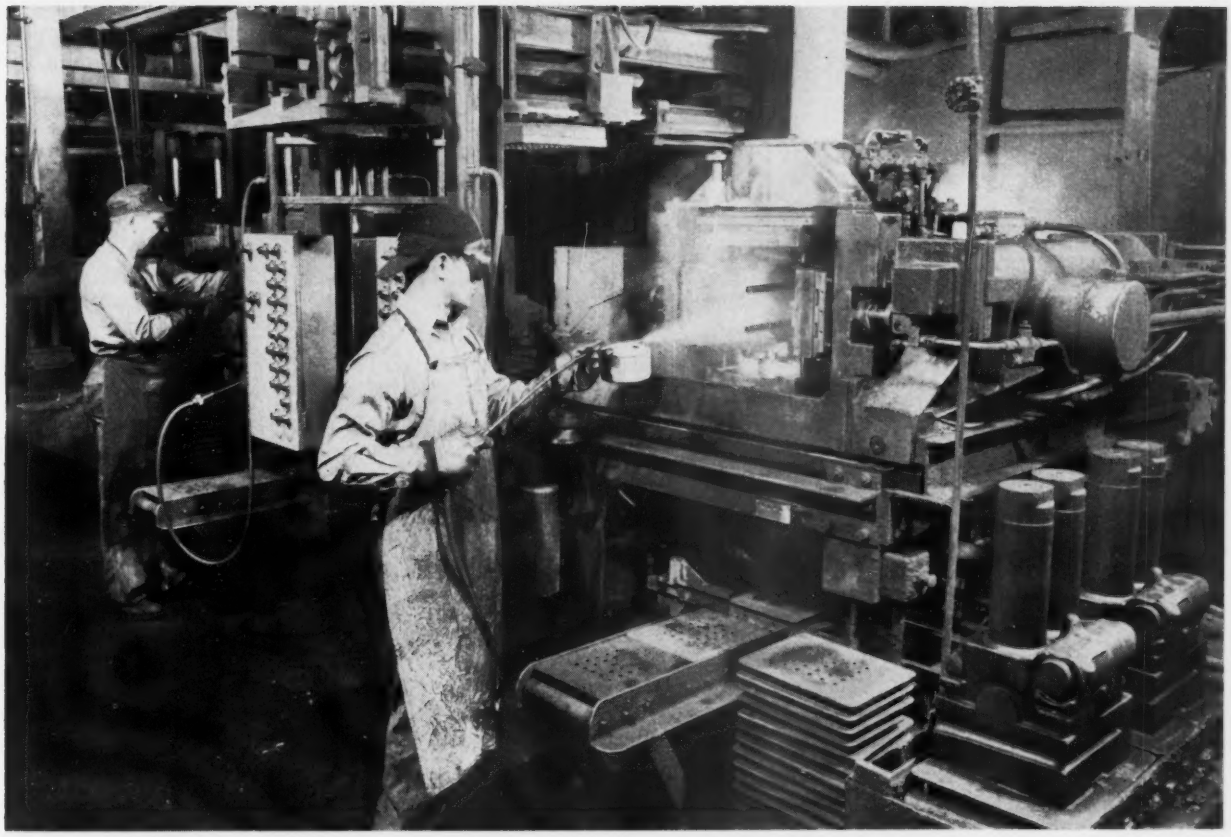
Strike-off sand from coremaking operations and sand from the reclamation unit also is stored for reuse. Strike-off sand from the semi-automatic coremaking machines is carried by below-floor-level belt conveyors to a bucket elevator, which passes up through the building bay housing sand reclamation facilities. At one end of this bay are two hand-fed machines which grind up damaged, baked cores. Sand from these machines falls into the bucket elevator carrying the strike-off sand. The elevator discharges to a 24-in. belt conveyor paralleling the new sand conveyor. Hand-operated plows remove the sand to bins over the six mullers.

Sand Is Reclaimed—Molding department sweepings and sand dislodged from castings in the cleaning room are fed from basement belt conveyors to a rotating screen and over a magnetic pulley for removing refuse. Screened sand is fed into a tank of water and the slurry is pumped to a 160-ton capacity primary classifier tank in the reclamation room. Fines are floated off the top of this tank and pumped to the sludge settling tanks. Slurry from the primary classifier flows by gravity to two scrubbing tanks 4 ft in diam and 6 ft high where an electric agitator scrubs the sand.



Hose is being connected to pipes which deliver core binders from box cars to the storage bins

A monorail car delivers mulled sand to hoppers over core machines grouped around tower ovens



One of six double-end machines which make six-cylinder barrel cores. The cores at right have been dipped in corewash and are ready to be placed on monorail delivery conveyor

Slurry flows from the scrubbers to a 3 x 8 x 1-ft-deep rectangular tank. Floatable material is washed over a dam at one end of the tank to join the slurry of fines from the primary classifier. Heavier slurry flows out adjustable orifices in eight spigots through which counterflow water is passed. Adjustment of the counterflow water volume and sp'got openings controls grain size of sand particles flowing through.

Slurry from the receiving tank under the spigots is pumped to a circular filter table. A vacuum is drawn below the screen bottom of the table, and water forced through the screen is pumped to the sludge tanks. Sand remaining on the filter table contains 7 to 8 per cent water and is removed from the table by a screw conveyor to a rotating, cylindrical, oil-fired drier. Sand falls from the drier to a similar cylindrical cooler. Air is drawn through the cooler counter to the flow of sand and exhausted to a dust collector.

Cooled sand falls into a vibrating pan screen 14 in. wide and 25 ft long. Good sand drops through the screen to the pan and goes into a bucket elevator to a storage bin. An inclined belt conveyor under the bin conveys sand to the bucket elevator which handles strike-off core sand. However, the reclaimed and strike-off sands are handled separately for segregation.

Binders used in core and molding sands are unloaded from box cars by vacuum hose into a conically-shaped pressure tank from which they are blown through individual pipes into any one of eight

Barrel cores are inspected and patched on this conveyor. Core stock pile is shown in background

5900-cu-ft-capacity bins. A flexible pipe from the pressure tank may be connected to any of the delivery pipes.

Of these materials, a standard and a heavy corn flour and southern bentonite are used in core sand mixes. They are moved from storage bins to hoppers over each pair of mullers by a tubular flight conveyor.

Ganister and lump coal delivered by railroad cars is unloaded to a bucket elevator which feeds a drop-bottom lorry car traveling on rails over the 5900-cu-ft-capacity bins for these materials as well as coke and limestone bins.

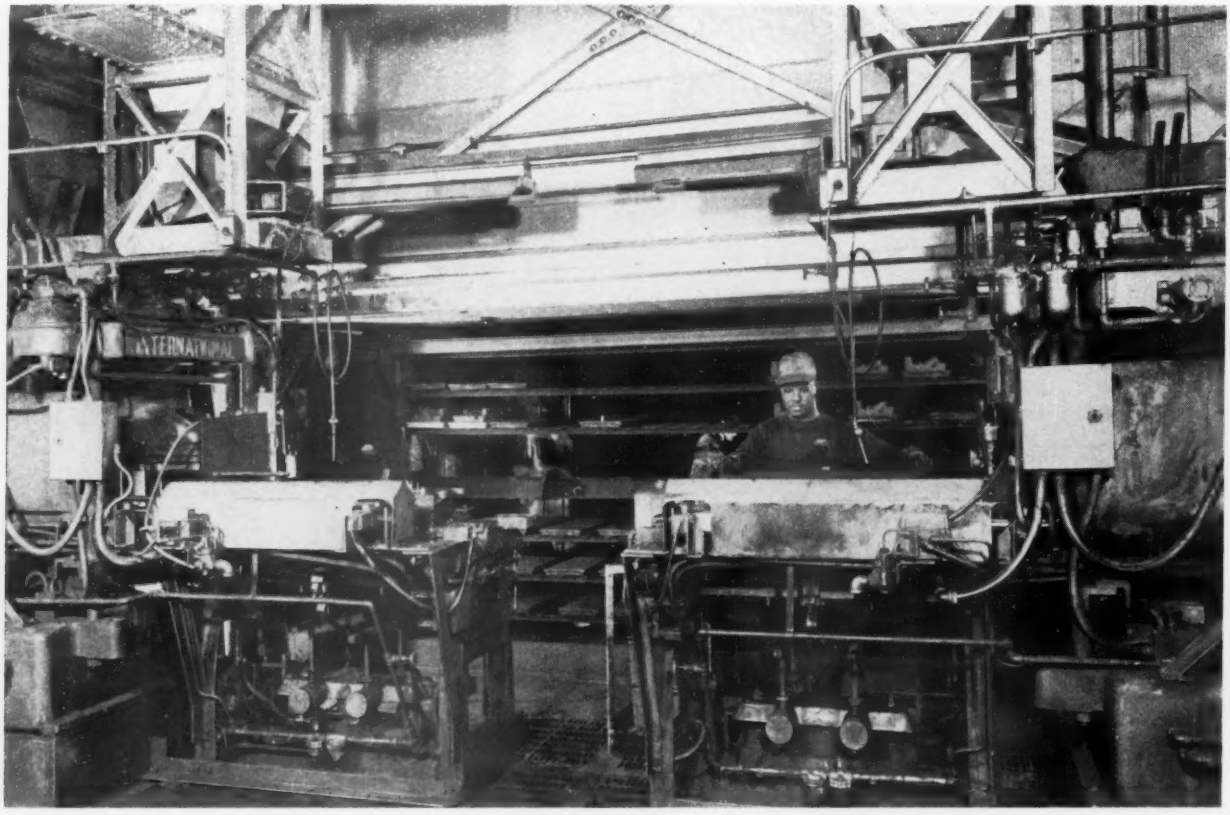
Core Sand Mulling—Six mullers prepare 4000-lb sand batches for the coreroom. Dry materials are added through a weigh hopper. Water and oil are metered. Following an 8-minute mixing cycle, mulled sand is elevated to one of three 7000-lb capacity storage bins, each common to two mullers. One man operates two mullers alternately; loading, mixing and emptying operations are individually controlled through hand levers or pushbuttons. A sample from every batch is sent to the sand laboratory for testing.

Three, 2-ton capacity, electrically driven monorail cars operating over a mezzanine deliver mulled sand from two of the large storage bins to hoppers over the coremaking machines grouped around the tower ovens. Sand from the third storage hopper, fed by Nos. 1 and 2 mullers, is elevated to a 24-in. belt from which it is removed by hand-operated plows to hoppers over the six automatic coremaking machines on the straight flow production line.

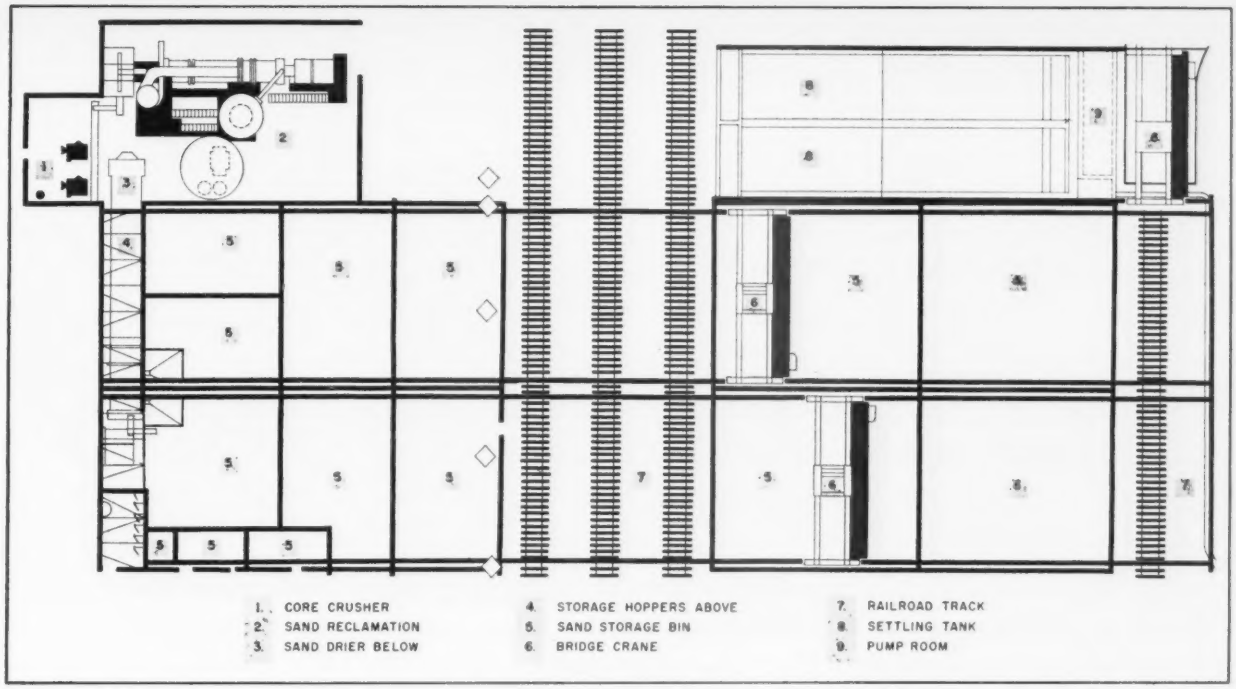
Straight Flow Lines—The six double-end machines make six-cylinder engine block barrel cores, and are set in a line between two overhead monorail conveyors. Two operators are stationed at each machine, and an air-operated shuttle, having a corebox at each end, moves the boxes under the blowhead alternately.

As a blown core is rolled from the machine, the box is rotated upside down by air cylinder and an air-operated stool raises to engage the core plate, hitting a limit switch as it does so. The four sides of the box are drawn back automatically and the stool, carrying the core, lowers. The plate containing the core is pushed along slide bars to a device which lowers the core into a tank of core wash. During these operations the corebox has revolved to a point where the operator can spray it and insert metal supporting tubes for the core barrels.

When the core is raised from the wash it is pushed by air cylinder to a roller conveyor where the operator blows off excess wash and sets the core on the monorail conveyor carrier shelves. Each conveyor then travels upward to pass through in-



Two of a battery of four coreblowing machines grouped around each tower oven. A roll-over draw unit and a shuttle, which moves coreboxes in and out, serve each machine



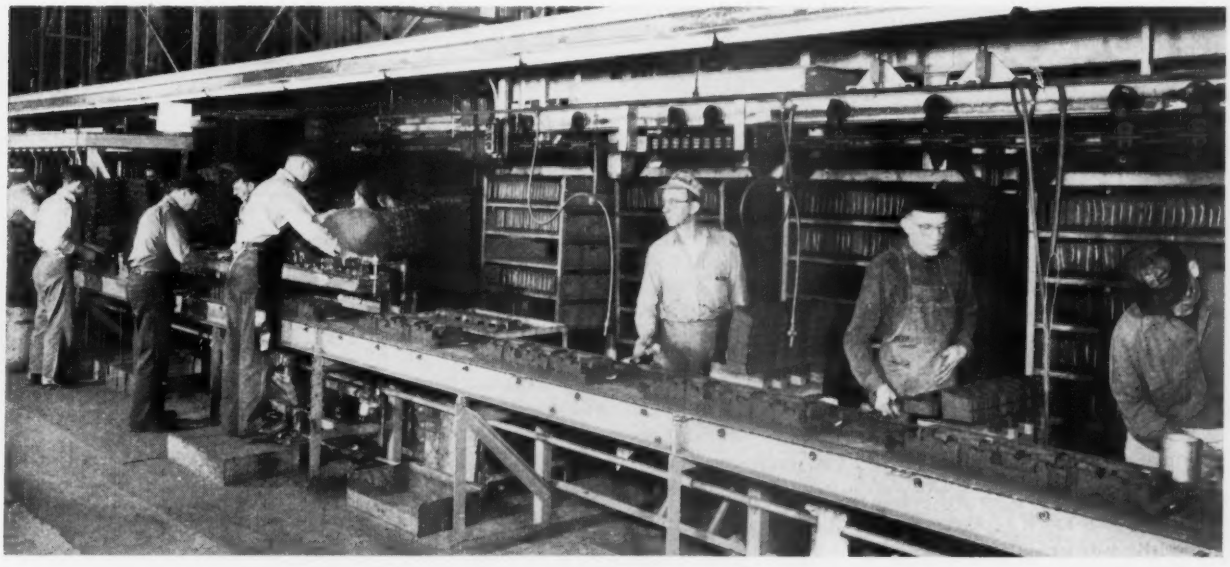
The 25,000-ton capacity sand storage area is across center of layout. Core crusher and sand reclamation system are at upper left, return sand settling tanks at upper right

dividual, horizontal drying ovens.

As the conveyors leave the ovens they lower to floor level at a point behind the line of coremaking machines. Cores are removed from the plates and put on separate 18-in. sliding belt conveyors serving each monorail for visual inspection, checking with jigs and patching. Plates are cleaned and remain on the conveyor for reuse as the conveyor returns past the machines. Cores are unloaded at the ends of the belt conveyor to a monorail delivery conveyor or to storage on the floor between the two belt conveyors.

Tower Oven Groups—Four blow machines are grouped around three sides of each of nine tower ovens. Each machine is served by one operator, a rollover draw unit and a shuttle which moves two boxes in and out of the machines alternately. Cores are removed by the machine operators from the draw unit to aluminum driers and loaded to carriers on the oven.

Group 1 machines produce slab cores for the six and V-8 cylinder heads. As cores are unloaded from the oven they are checked in a sizing fixture, brushed and blown off and set on a chain conveyor which carries them through a hooded unit for automatic spraying with graphite wash. The chain



Group 1, 2 and 3 coremaking machines make cores for the six-cylinder head assemblies fitted and pasted on this conveyor. Monorail storage racks are visible in background

Green sand and combination dry and green sand cores are used at Chevrolet. Here a combination core is made by setting two dry sand half cores on green sand halves, which have been rammed in a small rollover and struck off. Assembly is clamped, rolled over and drawn, center. Assembly is lifted from box with a fixture and set in mold, right

conveyor feeds them to a wire mesh belt which carries them through an infrared drying tunnel. Cores then are cleaned and rubbed and set on storage racks. There are ten racks arranged in two rows of five hung on closely spaced, parallel monorails. As racks are loaded, their movement around the monorail rectangle is performed by air cylinders through pushbutton control. Cores are loaded on racks on one side of the rectangle and unloaded on the other side for further processing.

Group 2 coremaking machines make cores for the six-cylinder head assembly. Baked cores unloaded from the tower oven are placed on storage racks hung from an overhead monorail loop.

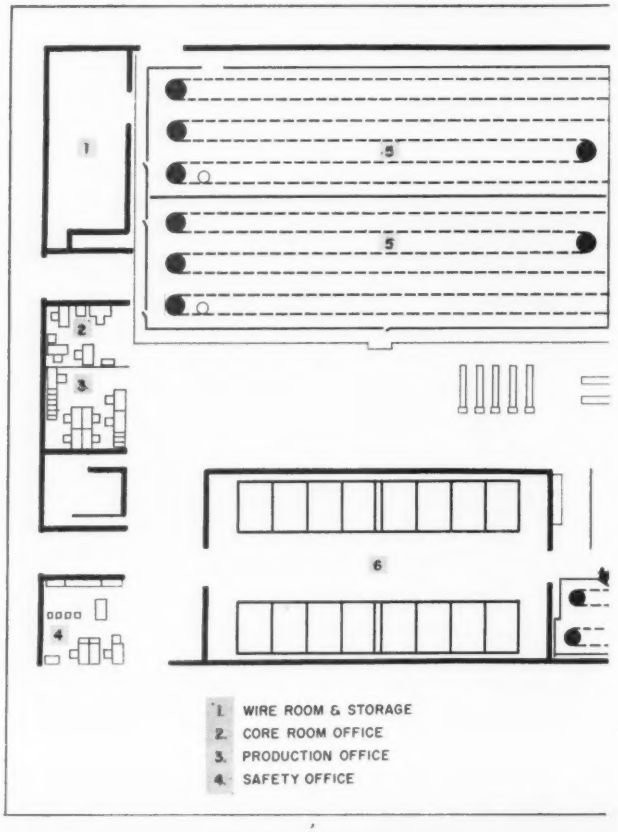
Port cores and one side core for the six-cylinder head assembly are produced on group 3 machines. They are unloaded from the oven onto pressed-wood boards and stored on eight short sections of roller conveyor. They are definned and mudded on benches at the end of the roller conveyors. Intake cores are dipped in graphite wash and hung, by a built-in hole, onto hooks on a small overhead monorail loop, which carries them through an infra red oven. Dried cores are unloaded from the monorail conveyor to pressed-wood boards and stored on the roller conveyors.

Head assemblies are pasted and assembled on an 18-in. sliding belt conveyor. Then they are loaded to an overhead monorail conveyor for delivery to the molding section.

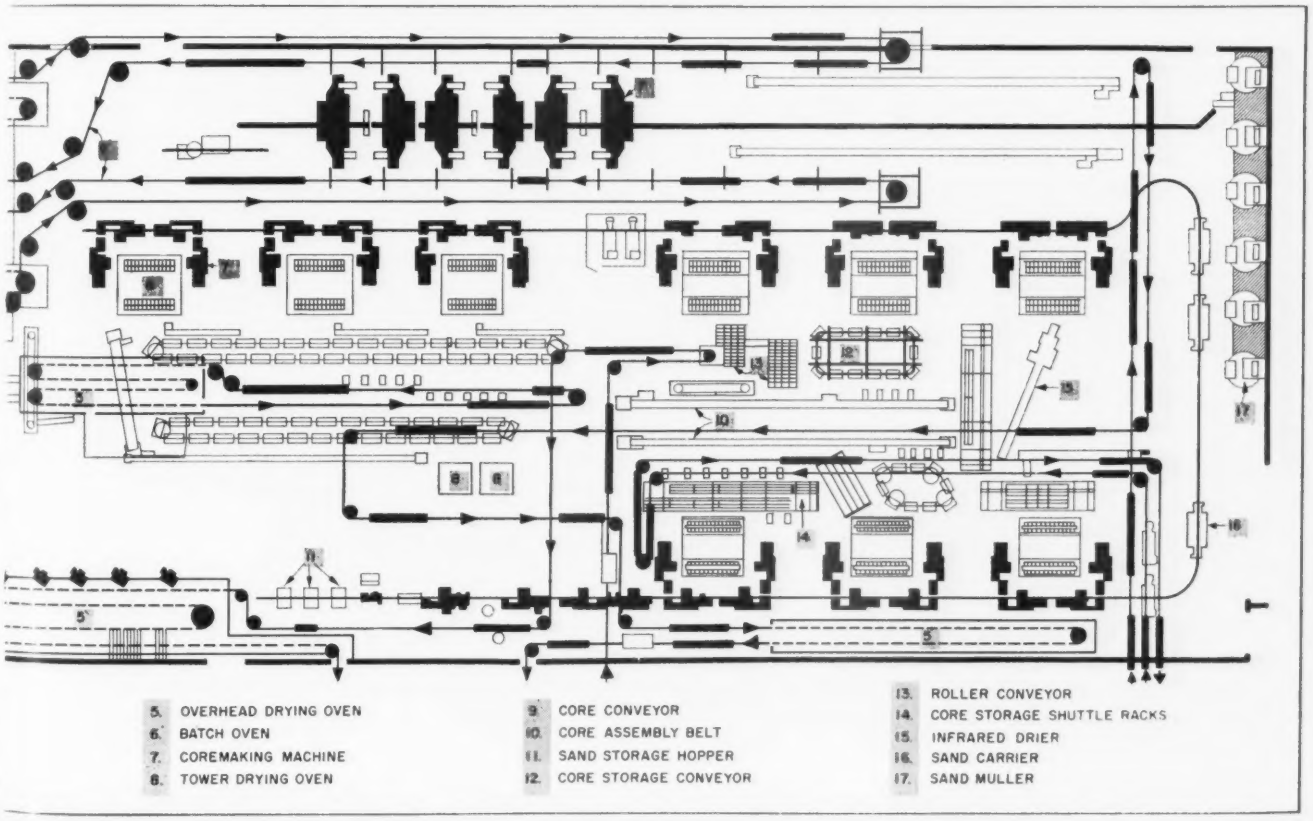
Right and left-hand exhaust manifold cores for the V-8 engine and exhaust and intake manifold cores for the six-cylinder engine are made on group 4 coremaking machines. Cores are removed from the oven to a storage unit similar to that used in group 1. Cores are removed to benches for rubbing, prior to loading on an overhead monorail delivery conveyor.

Group 5 machines produce water jacket cores, double exhaust port, cross over, and right and left-hand single exhaust port cores for the V-8 engine. Port cores are unloaded from the tower oven to four short gravity roller conveyors, and water jacket cores are unloaded to a short overhead monorail loop storage conveyor. All cores are definned, mudded and given a chrome dip, and then pasted into the V-8 head core assembly on a sliding belt

Layout of the 81,480-sq-ft coreroom, showing the 42 coremaking machines and auxiliary facilities



Six-cylinder water jacket cores are inspected, cleaned and mudded on this conveyor. Core in foreground rests on a unit which sprays insides of the thin walls with wash



conveyor. At the end of the conveyor, they are loaded to an overhead monorail delivery conveyor which passes through a drying oven on its way to the molding section.

Six-cylinder water jacket and transmission extension cores are made on group 6 machines. They are unloaded from the oven to a storage unit similar to that in group 1. From storage, they are placed on a sliding belt conveyor for mudding and cleaning. At the end of the conveyor they are set in a fixture which sprays the insides of the thin cylinder walls. Cores then are loaded to the delivery conveyor which carries the barrel cores. Strainer cores are trucked to this point and loaded on the same conveyor.

Group 7 machines make front end, rear end, rear barrel, front end fuel pump and rear end oil filter cores for the V-8 engine. Front barrel, center barrel and distributor cores are made in group 8, and the V-8 slab and right and left-hand water jacket cores are made in group 9. Cores from these units, except for the slab core, are unloaded to three short belt conveyors for cleaning, mudding and pasting. From there they are loaded to an overhead monorail storage loop conveyor. They are taken off the other side of the loop, dipped in a chrome wash and loaded to a monorail conveyor which travels through a horizontal, overhead drying oven. After drying, the cores are unloaded to a second monorail storage loop and taken from there to a sliding belt conveyor for pasting into the V-8 block assembly. Slab cores, made in group 9, are put on a belt conveyor after definning for delivery directly to the sliding belt for assembly.

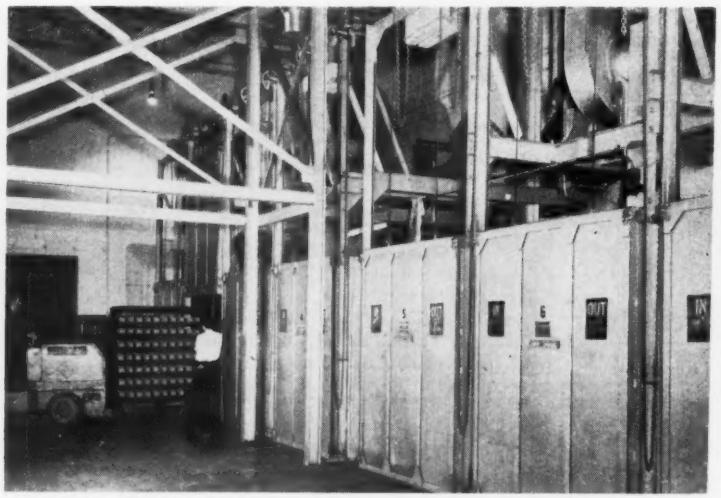
Block assemblies come off the end of the sliding belt to an automatic loading device which places them in either of two small tower ovens for drying the paste. They also are unloaded automatically to roller storage conveyors and then hand-loaded to the delivery conveyor carrying the six-cylinder engine barrel, water jacket and strainer cores. On its way to the molding section, this conveyor travels through an overhead oven for drying the wash on the jacket cores.

The automatic loading and unloading mechanism consists of two loading and two unloading units. Each of the loading units removes two core assemblies, that have been prepositioned on the end of the assembly conveyor, by arms actuated by motor-driven cams. Arms carry the cores into the oven. The rising shelves of the oven pick cores off the arms and carry them through the drying zone of the oven. Unloading units work in reverse order to remove the cores from the oven and load them to the delivery conveyor. All machines are interlocked electrically with the assembly conveyor, the tower ovens, and the delivery conveyor, by limit switches to stop one movement and start the next movement. All movements are controlled by cams or eccentrics driven by electric motors with speed reducers, clutches and brakes.

Opposite groups 7, 8 and 9 are five blow machines, similar to those grouped around the tower ovens, plus five jolt machines. The blow machines produce cores for the six-cylinder intake manifold heater, six and V-8 transmission case, V-8 clutch housing set core, transmission extension set core, and the main bearing set core, exhaust manifold set core and end core for the six-cylinder engine. The jolt machines make V-8 oil pump body and strainer cores.

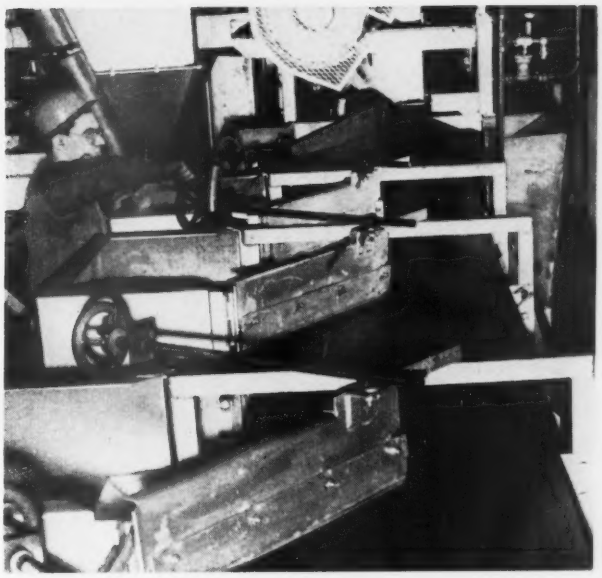
Cores from these machines are loaded on portable racks and moved by electric pallet trucks to any of 16 batch-type ovens for baking. The same trucks are used for removing the racks from the ovens and setting them in any areaway for cooling. A series of benches and short sliding belt conveyors are used in definning, dipping and assembling these cores into groups on portable racks for pallet truck movement into the molding section.

Miscellaneous cores are made on five jolt machines, loaded on racks and baked in batch ovens



A rack of cores is being loaded into one of a battery of 16 batch-type core ovens for baking

MOLDING



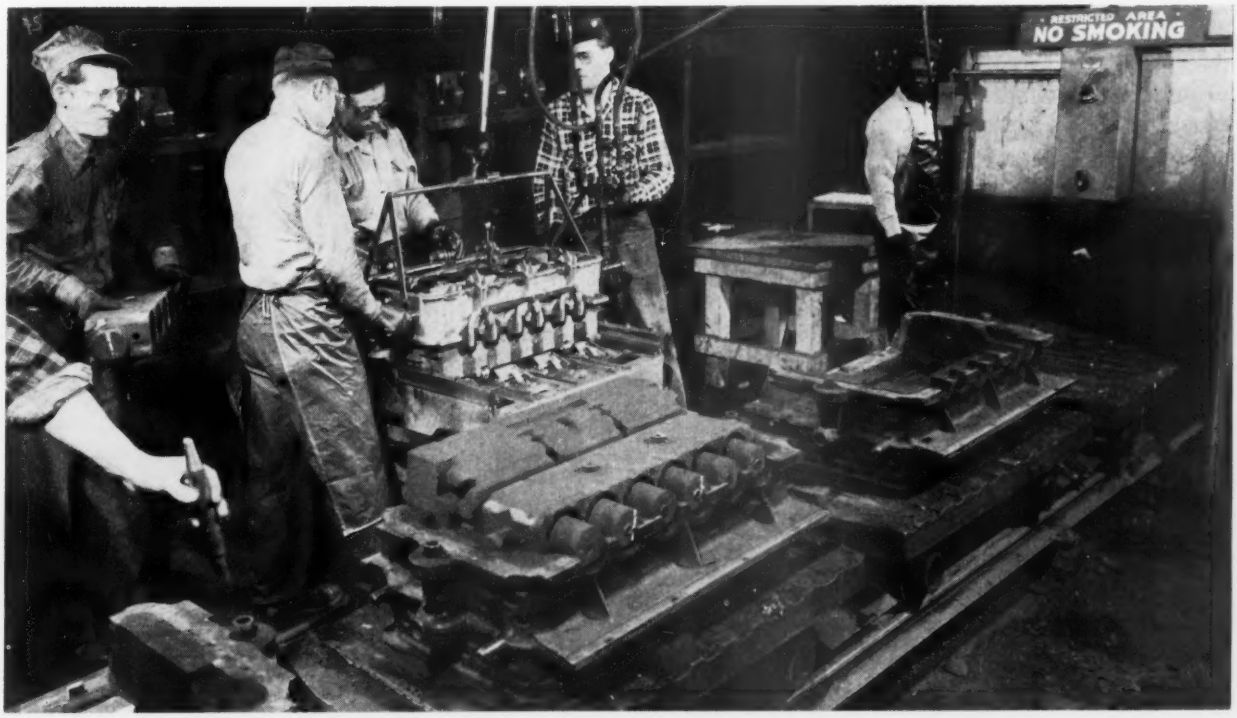
Adjusting sand delivery belt plows over supply hoppers serving the molding machines on line 5

CHEVROLET engine castings are made on six molding loops. Four loops, occupying a little more than half of a rectangular bay, have individual sand preparation and distribution systems. Lines 5 and 6, located in half of the remaining area, have a common sand preparation system and two distribution belts. Opposite these lines is a jobbing floor where miscellaneous castings and repair parts are made.

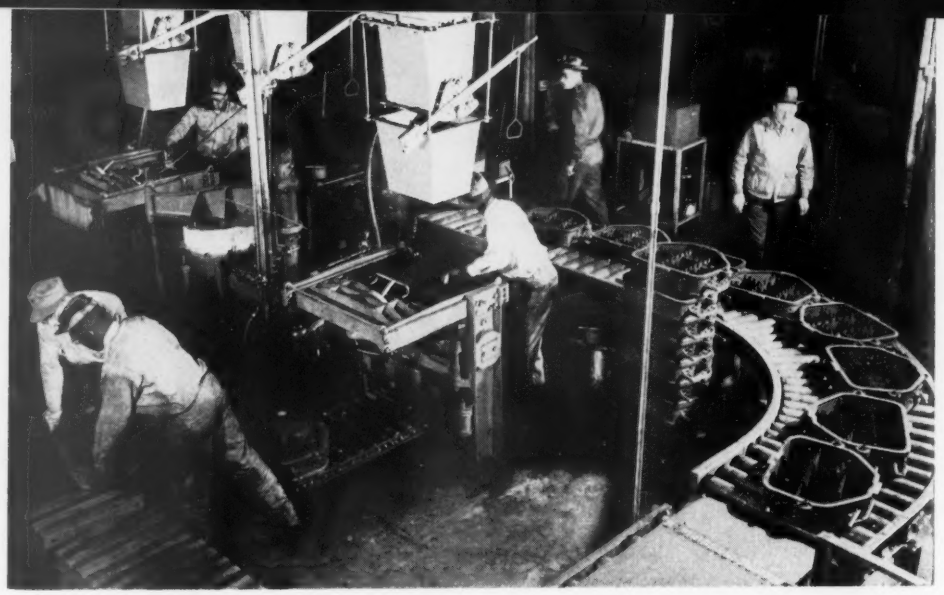
Molding sand properties are kept within the desired range by mixing the closed system sand with a slurry of seacoal and western and southern bentonite prepared in a central blending area. Seacoal used in the slurry and in jobbing and make-up bond mixes also is made in this area by grinding soft coal in two crushers. Seacoal falls from the crushers into a pressure tank from which it is blown pneumatically through pipes to a storage bin.

Slurry and Special Sand Mixes—Slurry is mixed in two, continuous mixing tanks. Water is mixed with seacoal and western and southern bentonite in one tank, and with only the bentonites in the other tank. A vibrating feeder supplies seacoal from the bottom of its storage bin to the slurry tank. Bentonites are fed from storage bins by a rotary gate valve, and water is metered. Additions are continuous, agitation being provided by propellers on the end of an electrically-driven shaft.

The slurry is pumped from the tanks in 3-in. recirculating pipes to continuous sand mixers at the molding lines. Pressure in the slurry lines is 55 psi, and two, 150-gpm pumps distribute the mix. A



Barrel and water jacket cores unloaded from monorail delivery conveyor in background are assembled in a jig, then placed in the drag by a clamping fixture as shown above



On line 3, green cores for the clutch housing are made on three machines outside of the car conveyor loop. Flasks are delivered to the machines on the roller conveyor branch

third pump is maintained in standby readiness.

Jobbing, make-up bond and cupola bottom sand mixtures are prepared in a 4000-lb capacity muller in the slurry preparation area. Seacoal and bonding clay are fed to a weigh hopper over the muller by vibrating feeders. Lake, bank and reclaimed sand come from separate storage bins through screw conveyors to 24-in. belt conveyors feeding the weigh hopper.

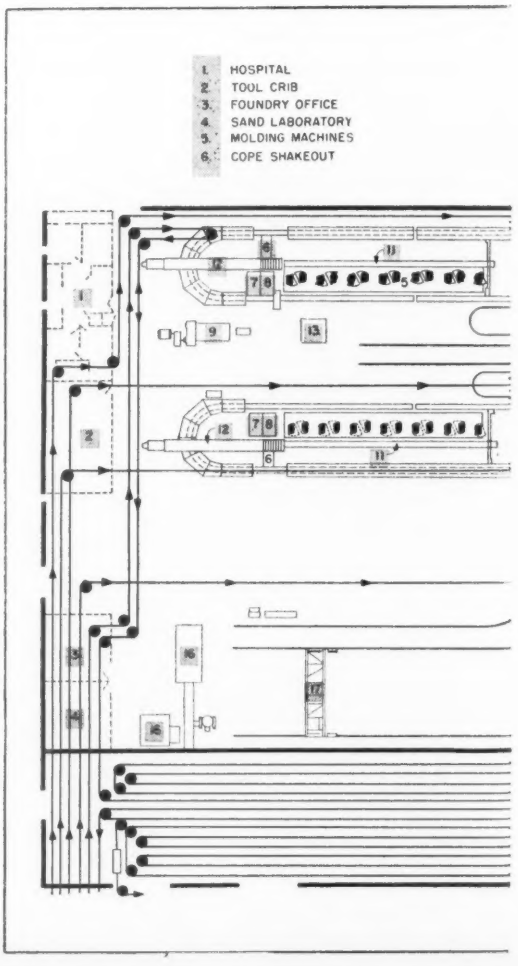
Western and southern bentonite are fed by gravity from storage bins through rotary gate valves to a 7½-cu-ft capacity pressure tank and are blown through a 4-in. pipe equipped with a switch leading to two bins of 36 cu ft capacity each. Air-cylinder-actuated gates in the bin bottoms release the bentonites to the weigh hopper. Water is metered.

Mixtures are dropped from the muller to a vibrating conveyor, feeding a bucket elevator which empties to a screw conveyor over three, 8-ton capacity hoppers. Air-cylinder-controlled gates in the screw conveyor housing release cupola bottom, make-up bond and jobbing sands to the proper hoppers. Air-cylinder-controlled gates in the bottoms of the hoppers discharge sand to 1½-ton capacity front dump trucks for delivery to point of use.

The make-up bond sand mix is used on line 1 and is dumped by the trucks into a floor-grated hopper near the sand mixer. It is added to the system by an underfloor apron conveyor as needed. Additional bonding clay and cereal hulls are delivered to the mixtures on lines 1 and 2 pneumatically through pipes from a pressure tank.

Handling of Molding Sand—Sand systems on the molding lines are basically the same and are shown in diagram A. A continuous sand mixer receives sand from two, 125-ton capacity hoppers, which have apron conveyors at the bottom, feeding a chute. Also slurry with seacoal and slurry without seacoal and plain water are delivered in separate pipes. Flow through these pipes is controlled by a man on the sand deck from which he also operates plows for filling molders' hoppers. Mixer discharges to a bucket elevator, which discharges through an aerator to an overhead, 24-in. distribution belt. Hand-operated plows remove sand to molders' hoppers. Near the end of the belt, sand may be diverted from the top strand of the conveyor, through a chute, to the bottom strand. It is carried back near the bucket elevator and plowed off into a surge hopper, from which an apron conveyor moves it to a chute, feeding the bucket elevator.

If overflow sand is to go through the entire system it is allowed to flow off the top strand to a chute which empties onto the strike-off and shakeout sand belt in the basement. This belt feeds a re-



volving, cylindrical screen which deposits refuse to a belt conveyor emptying into a container. Screened sand falls through a chute to another 24-in. belt conveyor and is carried over a magnetic pulley to a second bucket elevator. Floor sweepings and make-up bond sand additions also are made on this belt from a hopper under a floor grating. An apron conveyor under this hopper moves sand to a chute which empties to the belt. The elevator empties onto a belt over the two, 125-ton storage bins, and sand is diverted to the hoppers by plows controlled automatically by sand level probes in the hoppers.

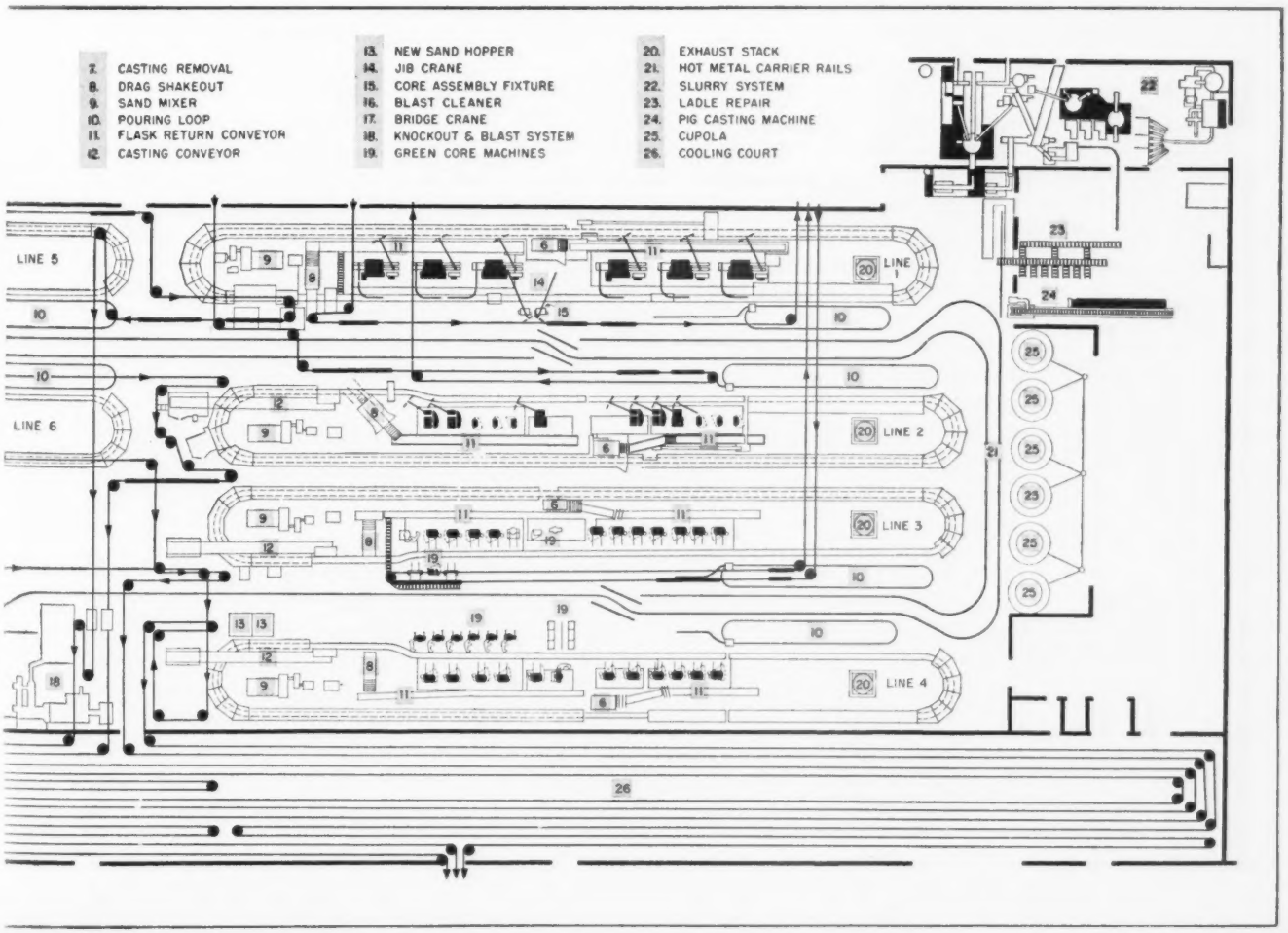
Molding Line Operations—V-8 and six-cylinder blocks are produced on line 1. Drag molds are made on three semiautomatic jolt squeeze machines. Cast steel flasks made and machined to Chevrolet's specifications are used throughout the foundry.

Empty flasks then are pulled in from a roller conveyor extension at the side of each machine to rest on a wheeled conveyor over the pattern. The pattern is raised into the flask, and the flask is filled, jolted and squeezed. When the pattern has been drawn down, an air cylinder arm pushes the mold out the other side of the machine on a wheeled conveyor extension which lowers it to a second wheeled conveyor at right angle to the extension. An air cylinder arm pushes the drag mold out to the front of the machine, where it is lifted by air hoist on a jib crane to a car conveyor.

Six-cylinder head cores are set into the mold on molding line 2 with help of a hand fixture

Strainer cores are set. Then the car passes through an open side hood and the drag is hand sprayed with a mixture of gasoline, fuel oil and graphite. Barrel and water jacket cores are unloaded from the monorail delivery conveyor to a jig which closes by air cylinder to assemble the cores, and then opens by spring pressure. The core assembly is set in the drag by an air-actuated

Layout of the molding and core knockout areas. The casting cooling court is shown across bottom



Pouring off a mold of miscellaneous small parts on line 5. All the pouring stations are hooded

Cylinder blocks are hooked from molds on line 1 and are hung on an overhead monorail conveyor

clamping jig suspended from an air hoist on a jib crane. Two such assembly and setting jigs handle cores on this line.

Core assemblies are checked in the drag with a fixture, and the bottom joints of the three barrel cores are muddled. Copes, made on three machines similar to those making the drags, are set in place with air hoists on jib cranes. Molds are clamped with wedge-shaped gripper clamps.

Completed molds are poured with electrically driven and raised, hand-tilted ladles under a compensating air ventilation hood. Then they enter a cooling tunnel at the end of the molding line loop.

About halfway down the back leg of the loop, the clamps are removed and tossed to an 8-in. belt conveyor, feeding a cross belt to a chute for deposit in a container at the point where they are put on the flasks. A man with a bar breaks off the sprue, and an air cylinder arm, operated by a switch actuated by each mold, tilts the cope off and lets it fall, upside down, on a shakeout. Cope flasks come off the shakeout to a declined roller conveyor and onto an inclined belt conveyor which carries them behind the cope molding machines. They are lifted by air hoist on a jib to the roller conveyors extension feeding each machine.

The car conveyor continues around the loop to a point where two men hook a chain sling onto the blocks, lift them out of the molds with an air hoist and hook the sling on an overhead monorail conveyor, which carries them to the cleaning room.

Empty drag flasks are pushed off the cars automatically by an air arm to a shakeout. Flasks slide off the shakeout to powered rollers which roll them through a water spray to a second set of powered rollers which carry the flasks at 90 degrees to their original travel to a belt conveyor located behind drag molding machines. Man with an air hoist on a jib moves flasks to the conveyor extensions on the machines.

Other Line Operations Are Similar—Line 2 produces heads, flywheels and oil pump castings on 12 jolt-squeeze-draw machines—six making copes and six drags. Head molds are lifted from machines to car conveyor by air hoists mounted on jibs. Other molds are moved by hand. Oil pump cores are set with a hand fixture, and a strainer core is set in the flywheel mold by hand. Air hoists on jibs are used to close head molds; all others are closed by hand.

All molds are clamped with metal wedges and poured under a compensating air hood before entering the cooling tunnel. Clamps are removed on the back leg of the loop and returned to point of use on an 8-in. belt conveyor. Sprues are broken loose with an air chisel. A second man loosens the cope with a bar and the third man tosses copes to shakeout with an air-operated lift hook. Cope flasks slide off the shakeout to powered rollers which move them to a conveyor belt behind cope machines. Flasks are moved from belt to machines by hand.

Cylinder heads are removed to shakeout by a man with a forked bar suspended from a chain. They come off the shakeout into a rack from which they are pushed by air-cylinder-operated arms actuated by a foot pedal to holders on the top of monorail-carried baskets which already have received flywheels and oil pump castings.

Flywheels and oil pump castings are removed on the front leg of the loop, just before the line of drag machines, by a man with a bar who pushes them to a chute, leading to an apron conveyor. They are discharged to a shakeout next to the head shakeout. Flywheels are pushed to a chute from which they are released by a foot-controlled air cylinder catch to the conveyor baskets. Oil pumps slide into a small hopper which is tilted, when full, by air cylinder and foot pedal control, to dump them into the conveyor baskets.

Drag flasks are moved off the cars to shakeout by a short belt conveyor, operating in a vertical plane and placed diagonally across the car conveyor. Powered rollers carry flasks from the shakeout to a belt conveyor behind the machines.

Use Green Sand Cores—Manifolds, clutch housings and transmission parts are made on lines 3 and 4. Inside the loop on line 3, five jolt-squeeze-lift machines make the drags for manifolds and transmission parts. Opposite these machines, outside the loop, two jolt-squeeze, rollover-draw machines make green sand cores for the clutch housing. Between these machines is a jolt-squeeze machine for making the drag, which is moved by hand to the core machines and clamped in position on the core. The assembly is rolled over and drawn down. The filled flask is pulled out the bottom of the machine on a wheeled conveyor and lifted to the car conveyor.

Three identical machines for making the same drag and green core are located inside the loop between the five drag and seven cope machines. Dry cores used in some of the molds are delivered by monorail conveyor. They are set by hand, with or without a fixture, depending upon the type of core. From here to shakeout, handling is the same as on line 1. At shakeout, just ahead of the drag machines, castings are dug out of the sand with bars and pushed to a chute. An inclined apron conveyor dumps them on a shakeout from which they are hooked into baskets on a monorail conveyor. Drag flasks are pushed off the car conveyor by an air cylinder arm to a shakeout. Powered rollers then move the flasks to a belt conveyor.

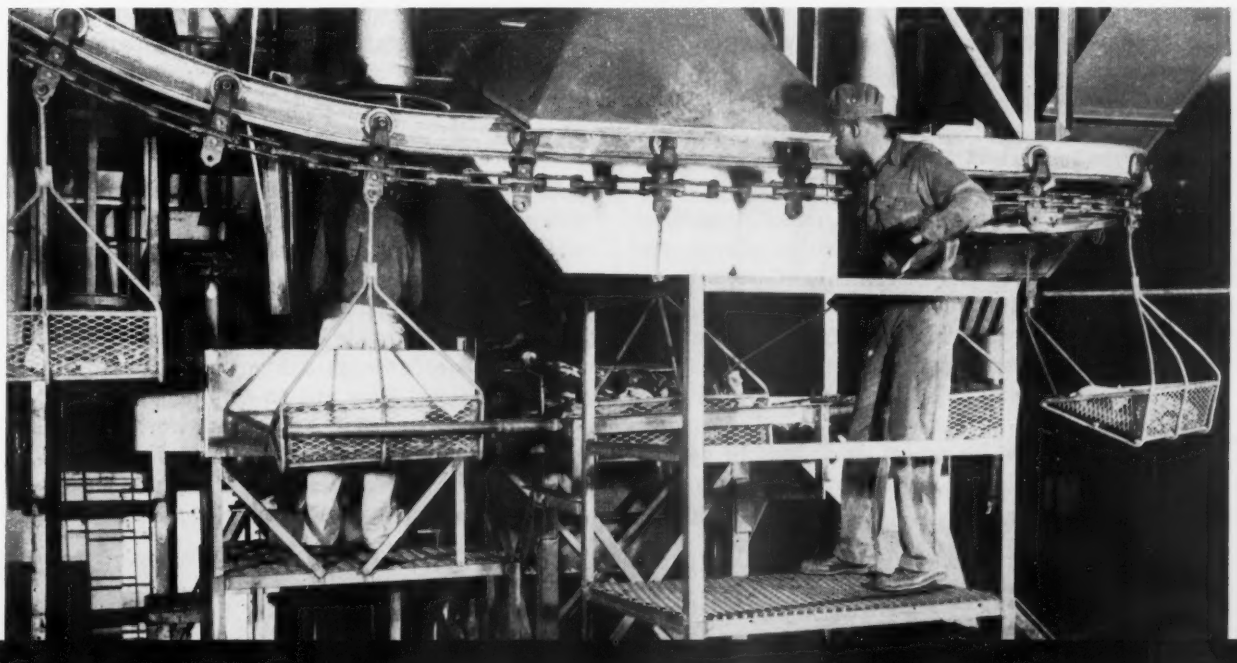
On line 4, six jolt-squeeze, rollover-draw machines are located outside the loop opposite six jolt-squeeze-lift machines which make drags. The outside machines make green sand cores for the truck transmission housing. Cope and drag for the core are made in a long, rectangular box, hinged at the middle of its length. After the core is rammed, the box is booked by flipping one side of the box over the other. Top portion then is swung back, leaving the completed core in one box.

A drag made on one of the drag machines is brought across the car conveyor by hoist on a monorail and clamped over the core. Assembly is rolled over and drawn down to a swing-out arm, and the drag and core are hand-lifted to the car conveyor. Two drag machines serve the six coremaking machines. The other four drag machines make drags for V-8 engine transmission parts.

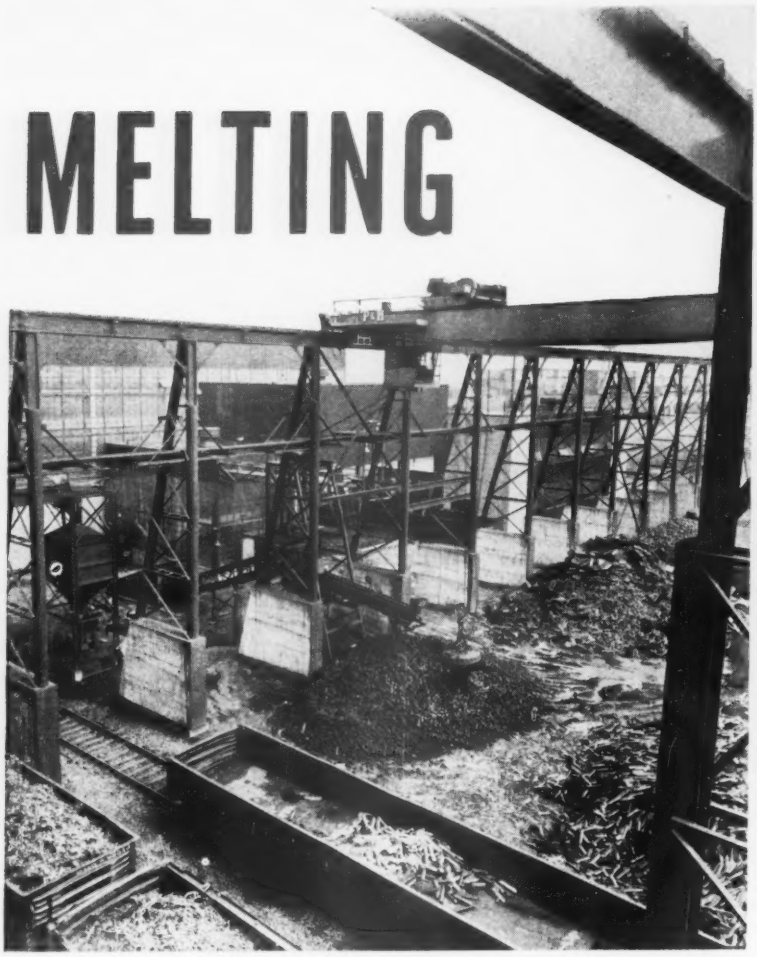
At the end of the line of coremaking machines described above are six more green sand core machines arranged on opposite sides of a sand storage hopper. These are small rollover machines in which half the core is hand-rammed. Two half cores are made in each machine. When they have been struck off, a dry sand half core is placed over the green sand half and a metal fixture placed over both. The assembly is clamped in place, rolled over and drawn down. Fixture and cores are set on a table and a hand setting fixture is hooked around the dry core, which now forms the bottom of the composite core, and the core set in the mold. Molds then are closed and handled the same as those on line 3.

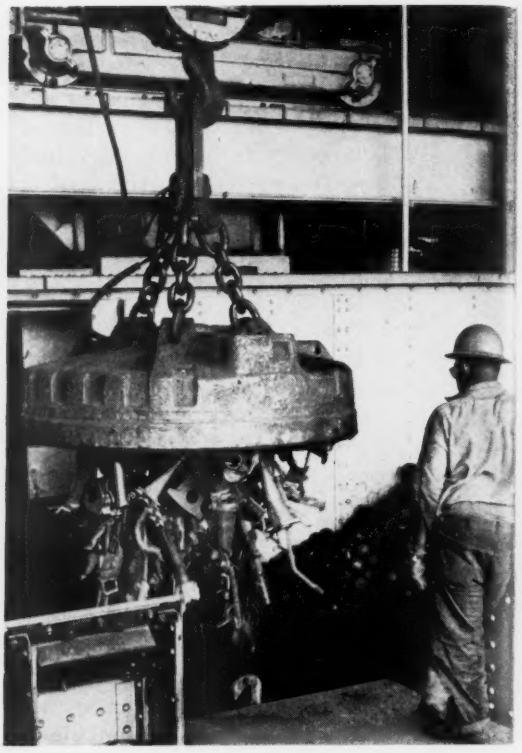
Miscellaneous small parts are made on lines 5 and 6, each of which have 13 jolt-squeeze-draw machines and are identical in other respects. They are similar to the other molding lines except that they are shorter and cope and drag shakeouts are opposite each other in the loop and feed empty flasks to a single set of power rollers and conveyor belts for return to molding machines. Castings are loaded from both lines into baskets on the same monorail conveyor for delivery to cleaning room.

Operators stand on platforms at the shakeout on line 4. One hooks castings to baskets on a monorail conveyor; the other hooks scrap to a chute feeding boxes in the basement



MELTING





Charging boxes below the level of the bins are filled by a combination of hand and magnet charging

Metal storage yard behind cupolas occupies an area about 70 ft wide, 200 ft long. It is crane serviced

MOLTEN iron at Chevrolet Tonawanda Foundry is supplied by six cupolas at one end of the molding department in a three-story structure about 93 ft wide, 187 ft long and 85 ft high. The cupolas are arranged in three pairs, and one of each pair is operated on alternate days.

Cupolas are closed top type. Effluent gases drawn off at the top are exhausted through tube-type heat exchangers 9 ft in diam and 20 ft high which preheat the air fed into the tuyeres. Each pair of cupolas is connected to one heat exchanger. Dampers in the take-off ducts are used to cut out the cupola which is not in use. Heat exchangers are equipped with fuel oil burners to supply heat at the beginning of melting and until the time when sufficient hot effluent gases are generated to carry the load.

Air blast to the cupolas now is maintained at about 450° F through a control panel located on the ground floor which automatically adjusts and records the temperatures in the heat exchangers. Temperature in the heat exchanger is adjusted through by-passing the burning effluent gases from the cupola. Heat exchangers have conical bottoms, and particulate matter or fly ash separated from the gases in the exchangers drops into the bottoms and is moved by screw conveyors to vertical pipes through which it falls into the wet slag disposal system.

Hot gases from the heat exchangers are carried across the roof about 40 ft in 36-in.-diam pipes to vortex chambers 18 ft in diam and 40 ft high where, through expansion and rotary action of the gas stream, most of the remaining fly ash in the gases is removed. Gases are vented to the atmosphere. Fly ash falls into the cone bottoms of the chambers, which are connected to screw type conveyors that carry it to a storage hopper nearby.

Cupolas Are Water Cooled—Cupolas are lined to about 75 in. at the melting zone section, which is water cooled. Above the melting zone the lining diameter is gradually expanded to about 95 in., and that diameter is continued to the top of the stack. Bottom plates of the cupolas are 9 ft above the floor level, and the charging doors are 20 ft from the bottom plates.

The cupolas are charged through two doors on opposite sides, in the front and in the back. Coke and limestone are charged in the front door by a mobile, hopper type scale crane suspended from overhead rails on each side of the travel area. Coke charge is 380 lb with 100 lb of limestone. Coke and limestone are stored in overhead bins above the scale car floor. Bins are 15 ft high and 15 ft wide with tapered bottoms, and extend for 112 ft. They will hold approximately 250 tons of coke and 200 tons of limestone. These materials are brought to the building in railroad gondola cars and dumped

Coke and limestone contained in overhead bins is discharged into a weigh hopper on a crane which moves the hopper into the cupolas, distributing the materials on the iron

into a hopper below ground level. From this hopper the coke and limestone are conveyed in an inclined skip hoist to a hopper above the storage bins. Coke and stone from the hopper are distributed to the storage bins by a hopper car.

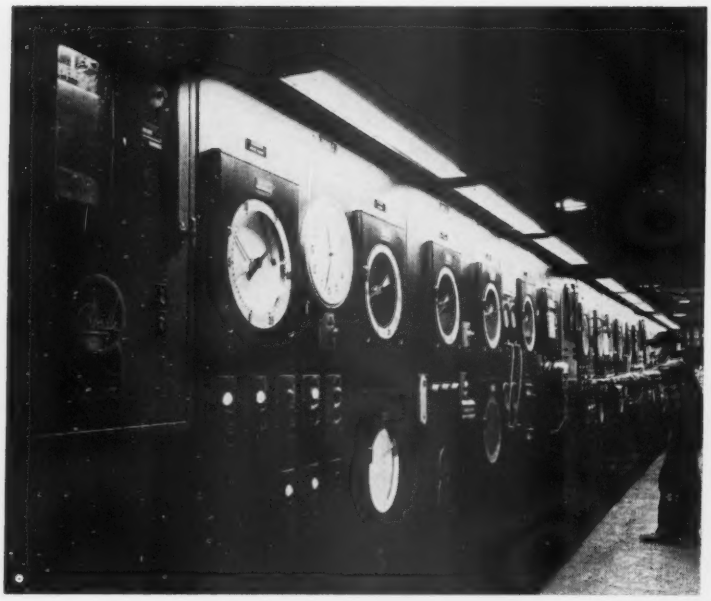
Metal is charged through the doors on the opposite side of the cupolas. The raw materials, consisting of cast iron briquets, return scrap, steel scrap and pig iron, are stored in a series of bins on the charging floor. They are brought to the charging floor bins by magnet crane from the main metal storage yard behind the cupola building. The yard occupies an area about 70 ft wide and 260 ft long. Charging floor bins are elevated about 5 ft above the floor level, and the materials are placed in rectangular charging boxes about 4 x 4 x 3 ft carried on scale cars. Charging boxes are loaded by a combination of hand and the magnet crane operation.

Loaded charging boxes are transported on the scale cars to the cupolas where they are shifted pneumatically onto elevated stands on each side of the scale car track. The loaded box is moved onto a stand by a pneumatic ram on the opposite stand pushing the empty box which it contains against the loaded box until the empty one replaces the loaded one on the scale car. Scale car with the empty box then moves back to the bins for loading. Loaded box on the stand is picked up by a crane and moved through the charging door into the cupola. There it is lowered a few inches to strike two water-cooled bars, which release the latches holding the center-pivoted bottom doors on the boxes. After the load is discharged, the crane moves the box from the cupola and lowers it onto an empty stand, which automatically closes and latches the bottom doors.

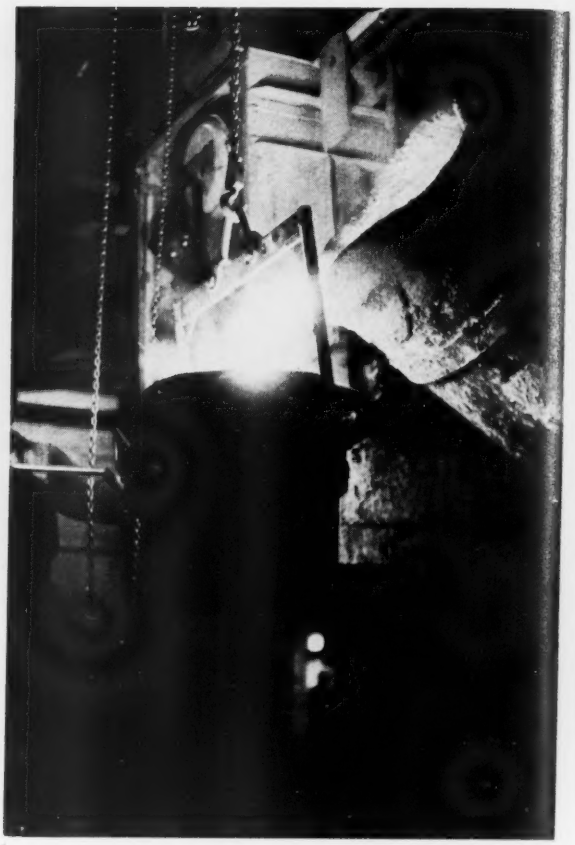
Produce Two Types of Iron—Metal charges weigh 4000 lb, and the components vary according to the type of iron being melted. Essentially two types, termed soft and cylinder iron, are produced. Cylinder iron is employed only for cylinder blocks. An average mixture consists of 27 per cent steel scrap; 30 per cent return scrap; 25 per cent cast iron briquets; 6 per cent alloy pig iron containing 17 per cent Si, 3.75 per cent Mn and 3.50 per cent Cr; and remainder pig iron. The soft iron mix contains about 18 per cent steel scrap, 25 per cent return scrap, 2½ per cent silicon briquets and remainder pig iron. This iron is used for a wide variety of castings including clutch housings, manifolds, water pump bodies, transmission cases, etc. A mixture of these two irons in the molten state —approximately 50 per cent of each—is used for a medium iron for cylinder heads, flywheels, oil pumps, bearing caps, etc.

Control of the iron characteristics is through a combination of chill test specimens, taken every 10 minutes, and chemical analysis specimens taken every half hour. Temperature observations are made at the spout with an optical pyrometer every 15 minutes.

Cupolas have 108-in.-diam shells which are lined down to 75 in. at the melting zone. They now are producing iron at the rate of 30 tons per hour. Air blast is supplied by an interconnected bank of four centrifugal blowers located on one end of the charging floor. Only three of the blowers are

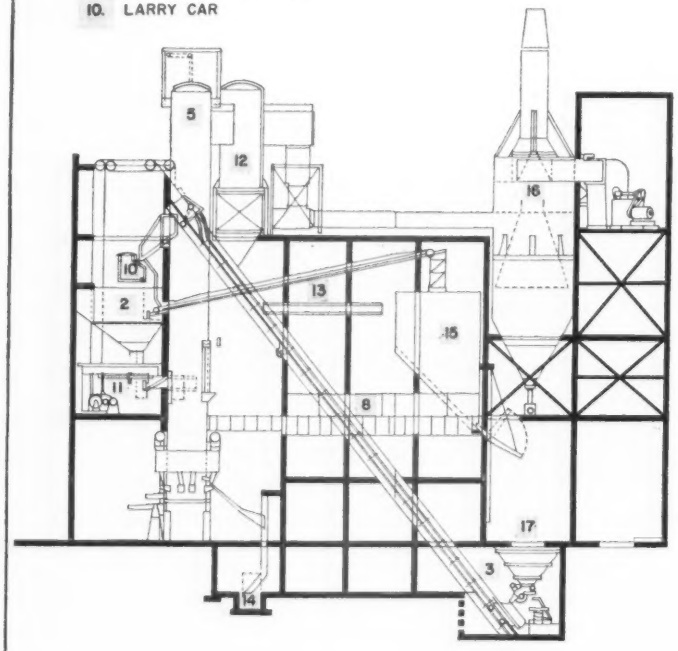


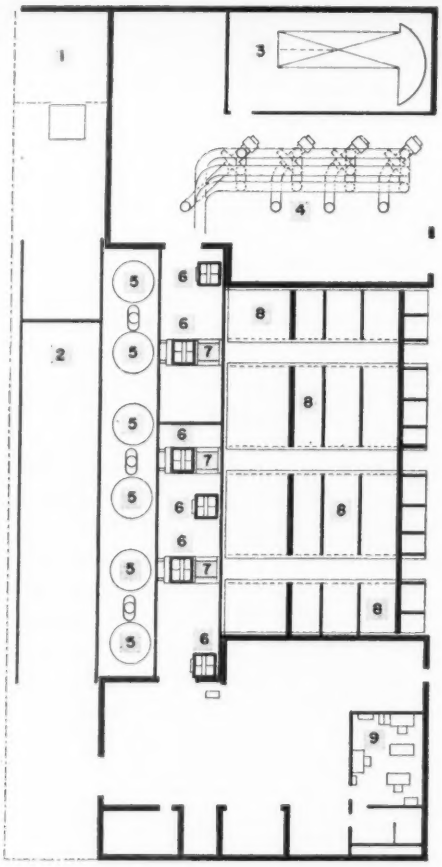
Cupola operations are controlled from a series of panel mounted recording instruments on the ground floor level



Molten metal from the 2000-lb capacity transport ladles is emptied into smaller ladles at the pouring stations

1. SKIP HOIST MACHINERY ROOM
2. COKE & LIMESTONE BINS
3. COKE & LIMESTONE SKIP HOIST
4. CUPOLA BLOWER
5. CUPOLA
6. CHARGING BUCKET
7. SCALE CAR
8. SCRAP, PIG IRON, BRIQUET BINS
9. MELTING DEPT. OFFICE
10. LARRY CAR
11. COKE & LIMESTONE CHARGER
12. HEAT EXCHANGER
13. CHARGE METAL CRANE RAIL
14. SLAG TRENCH
15. BREEZE BIN
16. VORTEX
17. TRACK HOPPER





Elevation and plan views of the cupola building showing the arrangement of equipment. Numbers on the drawings correspond to those on the listing given at the upper left

Transport ladles are carried in front of the cupola on two overhead rails. To make it possible to fill ladles on the outer rail, swinging extension spouts are employed

in operation at any one time; the fourth is held as a spare in case of a breakdown of any of the others. Blowers have a rated capacity of 17,500 cfm at 40 oz pressure each, and are operated from constant air weight control units mounted on a panel on the ground floor level.

As indicated previously, the air blown into the cupolas is heated to 450° F by the effluent gases. It is fed through ten tuyeres 12 in. in diam which are located about 22 in. above the taphole. Each tuyere is equipped with a counterweighted damper which automatically closes off the downcomer pipe from the windbox when the blowers are shut down. This prevents an explosive gas mixture from accumulating in the windbox and air supply system. Water jackets begin about 5 in. above the tuyeres and extend up about 4 ft. Jacket is composed of ten separate welded steel compartments which are baffled to prevent water stratification.

Rear Slagging—Cupolas are back slagged, the slag falling onto an inclined trough carrying a heavy stream of water. Mixture of granulated slag and water is carried to a trough in the basement where it separates. Slag is removed from the trench by a drag chain, which pulls it up a short inclined trough and discharges it into the boot of an elevator. The bucket elevator lifts the slag to the third floor of the cupola building, where it is discharged into a chute leading to a belt conveyor on the second floor which transports the slag across the room and outside the building. There the slag is deposited in a belt conveyor 80 ft long which carries the slag to two elevated hoppers. From the hoppers the slag is loaded into trucks and carried away for disposal.

Cupolas are tapped intermittently directly into transport ladles of 1 ton capacity. Ladles are carried by electrically driven cab-type cranes suspended from overhead monorails. Two monorail lines 4 ft apart are mounted parallel to the row of cupolas, the nearer line being 3 ft away. Beyond the cupolas in each direction the rail lines swing at 90° into the molding department and continue to the pouring loops of the several molding conveyor lines. There metal from the transport ladles is emptied into pouring ladles.

Cupolas Have Combination Spouts—Metal can be tapped into transport ladles on either of the two monorail lines and still permit the ladles on the line nearer the cupolas to pass by when required. This is accomplished by use of a combination of a fixed and a movable spout. The fixed spout, about 4 ft long, discharges metal into ladles on the inner monorail. The movable spout, 6 ft long, is mounted about 2 ft below and is swung in a horizontal plane by a manually-operated mechanism. When in use in filling a ladle on the outer monorail, the spout projects perpen-

dicular to the rail; then it is swung parallel to the monorail.

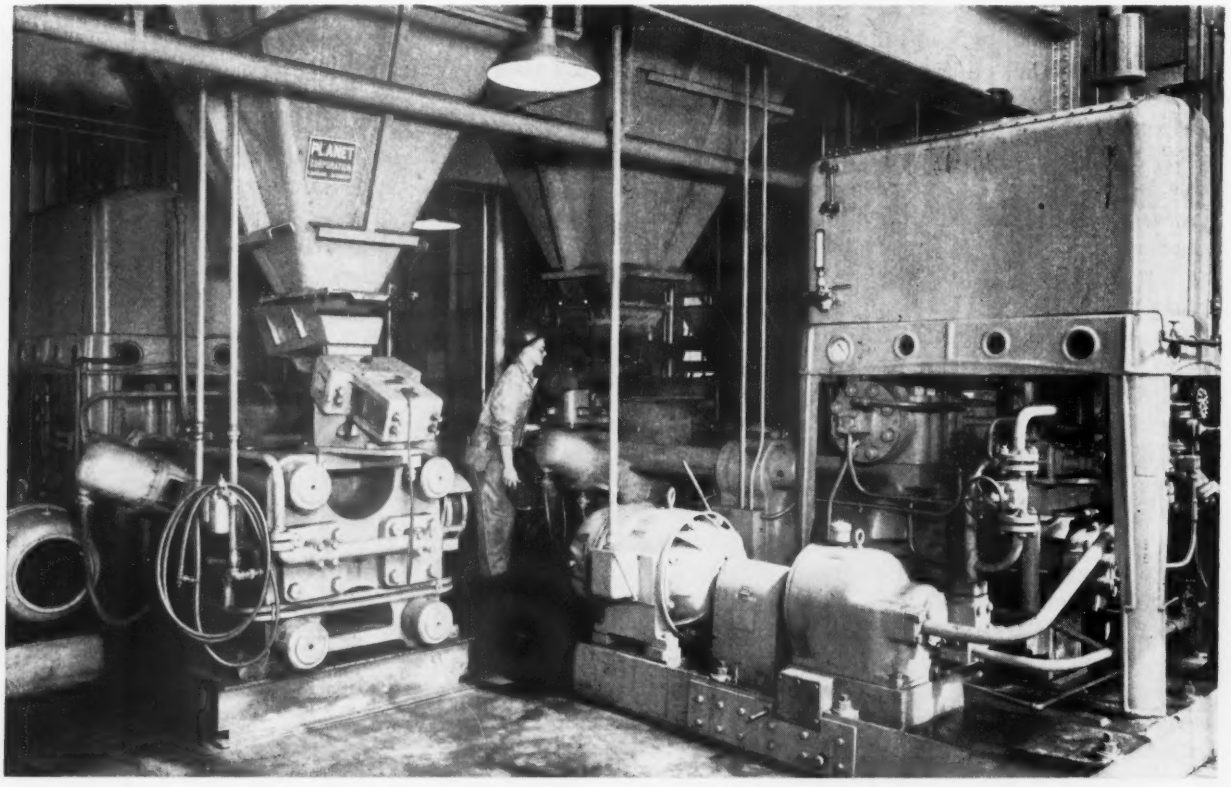
If the first iron tapped from the cupolas is not up to the desired pouring temperature, it is pigged in a conveyor type machine immediately adjacent to the line of cupolas. Machine is about 54 ft long with a capacity of 18 tons per hour. However, only about 1 or 2 tons of iron are pigged in a day.

Cupolas are patched by applying a ganister-sand-fireclay mixture pneumatically. The mixture consists of 675 lb ganister, 450 lb lake sand and 375 lb fireclay. This is mixed dry in a sigma-blade type unit and placed in an elevated hopper. From there the material is fed into a pneumatically operated unit or gun which transports it through 3-in.-diam rubber hose to the cupolas. A nozzle at the end of the hose injects a small amount of water into the dry ganister mix as it is blown against the cupola lining.

Ladle lining department occupies an area 50 ft wide and 68 ft long adjoining the cupola department. There all ladles are relined with a monolithic mixture rammed in place by hand. The composition contains 320 lb fireclay, 190 lb lake sand, 130 lb ganister and 100 lb eight-mesh graphite. This material also is mixed in a sigma-blade unit with about 6 per cent water to form a workable plastic mix. After the ladles are lined, the refractory is dried thoroughly by use of propane gas burners.

Produce Own Briquets—Cast iron borings for manufacture of briquets employed as part of some cupola charges are transported from the nearby engine plant in open gondola railroad cars to the briquetting department located about 100 ft from the cupola department. Borings are unloaded from the cars with a crane and bucket and placed in two large elevated hoppers just outside the building. Vibrating feeders at the bottoms of the hoppers feed the borings to a central chute, which drops them onto a short vibrating conveyor below the floor level. That carries the borings into the briquetting machine building and discharges them into the boot of a bucket elevator. The borings are lifted about 30 ft and discharged into hoppers above each of the three hydraulically operated briquetting machines. From there the borings are fed automatically into small hoppers on the machines.

Borings in these hoppers drop directly into the throats of the machines where they are forced into dies and compressed into small cylinders. The briquets are about 4 in. in diam and 4 in. high and weigh about 10 lb. Formed briquets are ejected from the dies and drop onto a transverse conveyor belt below the machines which deposits them on an inclined belt. The inclined belt elevates the briquets about 10 ft above the ground level and discharges them in the storage yard. Capacity of each briquetting machine is 3½ tons per hr.



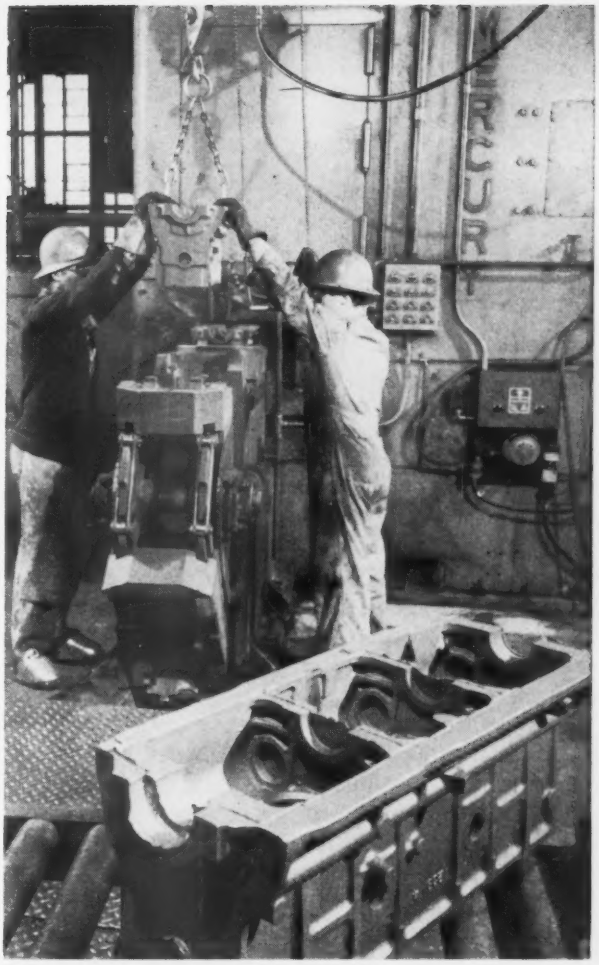
Borings and turnings from machining operations on the iron castings in another department are compressed into dense briquets which are used as part of the cupola charges

CLEANING

A COMBINATION of cleaning methods is employed in finishing castings at Chevrolet Tonawanda Foundry, the procedure depending on the type of casting. The cleaning department, located in the southwest section of the foundry structure, is 125 x 297 ft.

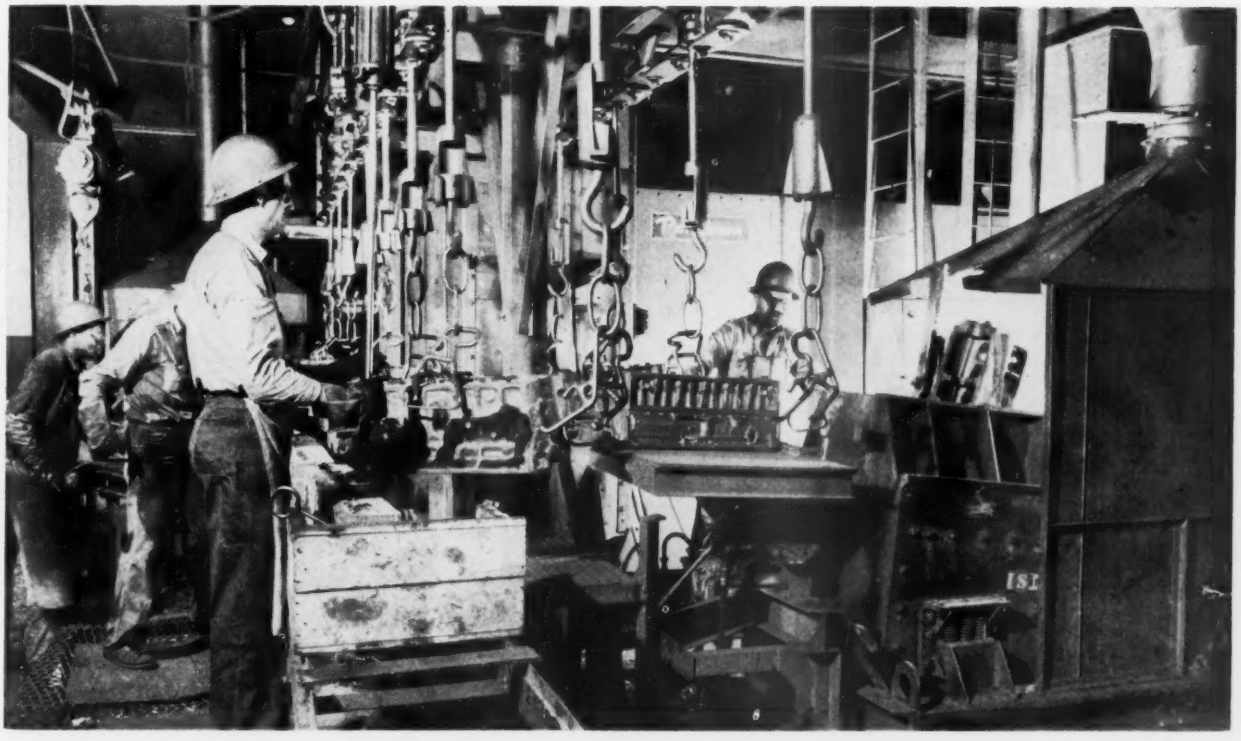
Before arriving in the cleaning department the castings are cooled so that they may be handled without difficulty. As mentioned in the description of the molding department, the castings are shaken out and placed in containers or hung on hooks suspended from overhead chain conveyor systems, which elevate them just under the roof trusses. The conveyors transport them out of the molding department into a long elevated cooling court extending east and west between the molding department and the cleaning and adjoining maintenance departments.

Cooling court is about 550 ft long and 42 ft wide. The several conveyor lines travel back and forth in the court for varying lengths of time depending on the size of the casting, or the number of castings in the basket or container. Minimum time of travel is one hour; the cylinder blocks, being massive, require a considerably longer time for



Cylinder block pan rails are ground by setting on a fixture which carries them under the wheel

Cooled blocks suspended on hooks pass through blast unit and are vibrated (right) to remove shot



cooling. Bottom of the court forms four V-sections, and drag chains moving along the valleys transport the sand dropping from the castings to the center where it falls into chutes leading to the basement, and thence into sumps. There the sand, mixed with water, is pumped to the wet sand reclamation system.

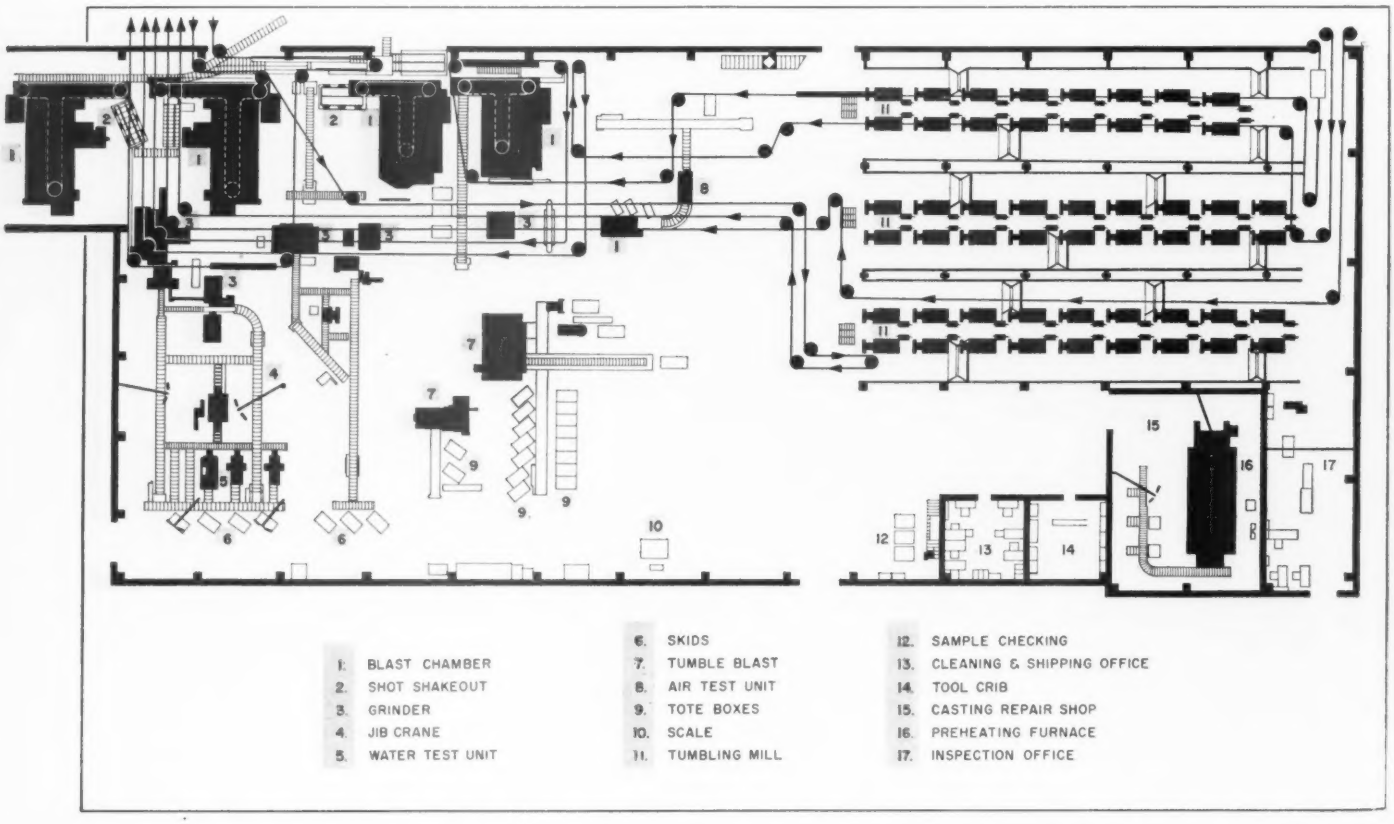
Draw Air Through Cooling Court—To speed cooling of the castings the court is equipped with 13 stack-mounted propeller exhaust fans located along the center line of the structure. Each fan has a capacity of 60,000 cfm. Sheet metal air inlets closely spaced along both sides of the court permit entry of outside air along the lower portion, and the fans in the center pull air across the castings on the conveyor lines.

Just before entering the cooling court, cylinder block castings have their cores removed by a vibratory knockout machine. The machine is mobile in that it travels parallel to the conveyor line, carrying the blocks at the same rate of speed. It operates automatically through several tripping devices. These in turn cause the knockout machine to move with the conveyor, clamp and vibrate the block over a hopper, stop the vibratory action, release the casting and cause the machine to move back to its original position for another operation.

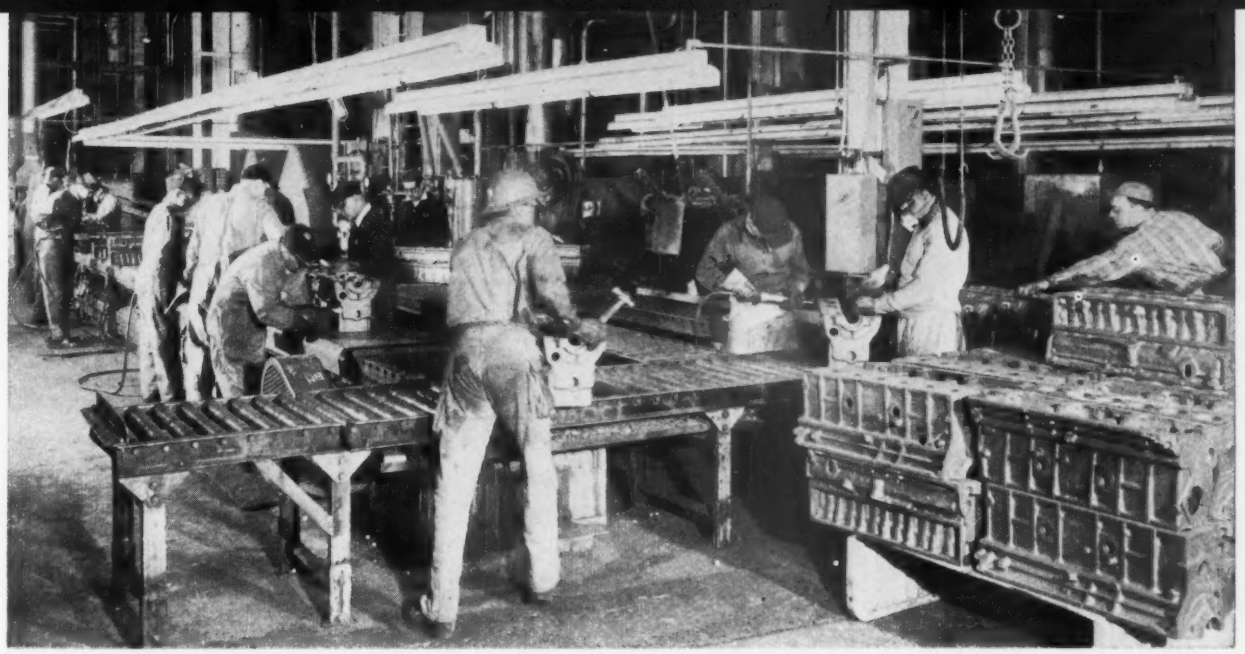
Dislodged sand and core vent tubes drop from the hopper into a rotary screen just below the floor. Vent tubes are discharged via a chute into tote boxes for return to the coreroom. Sand passes through a crusher to break up lumps and drops into a chute leading to the basement. There a belt conveyor transports it to a storage hopper in the molding department.

After the cores are knocked from the blocks, an operator with a sledge hammer knocks off the gates into a chute leading to the basement, where they are discharged in a bucket. Blocks leave the cooling court and descend near one end of the cleaning department. They are removed from the conveyor chain and placed on a vibrating grid shaker to remove any loose sand. Castings are attached to hooks on an overhead monorail system and pass through an abrasive blast chamber equipped with six centrifugal wheels. On emerging from the blast chamber the blocks are removed from the hooks and set on a vibrating grid, with the cylinder bores in the vertical position, to remove any shot that might be in various pockets.

Blocks Ground Automatically—Blocks are picked up with a hoist and set on end on another vibrating grid with the bores at a slight angle to the horizontal. They are held in this position for a few minutes by a blocking arrangement as a further aid in removing shot. When the block is released, it drops on a short section of roller conveyor with the crankcase side upward. Two men with a



Cleaning department plan view shows arrangement and identification of the equipment



Cleaned cylinder blocks are chipped, ground and inspected on a roller conveyor line

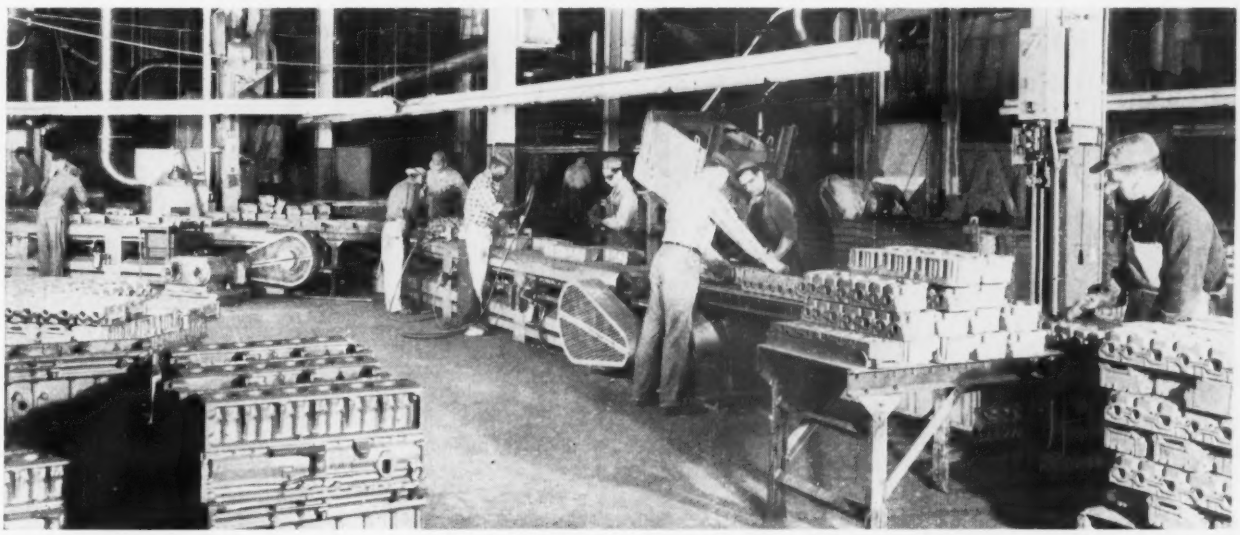
hoist pick up a block from the conveyor and place it in a grinding machine. This machine simultaneously faces off the pan rails, which are topside, and the top of the cylinder block, which is in the bottom position.

In the case of the V-8 cylinder blocks, because of a difference in shape and height, the machine grinds only the pan rails. After the block moves a short distance, it is picked up by a turnover mechanism and placed on a roller conveyor perpendicular to the first line. The block, with the top upward, then passes through a grinding machine having two angularly mounted wheels, which face off the banks of the block. After the grinding operations, the blocks on roller conveyor lines are chipped, ground and inspected.

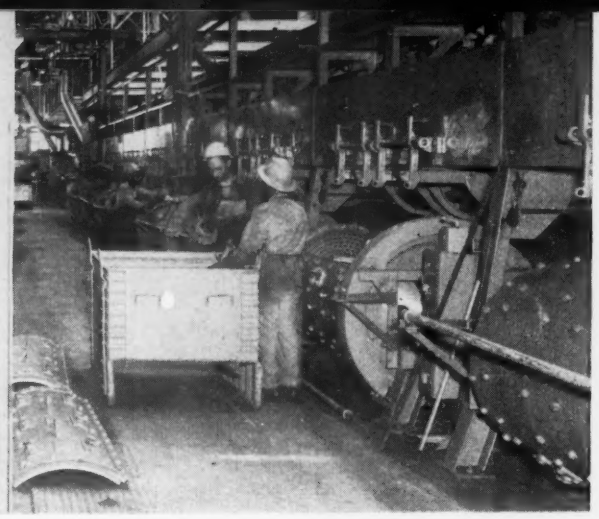
Conveyor line carrying cylinder heads, flywheels and small castings such as oil pump bodies, enters the cleaning room at the opposite or east end. As it passes along a row of eight tumbling barrels, the flywheels and small castings are taken off and placed in the barrels. The heads travel to the other side of the room where they are taken off, vibrated on a grid, and sent through a continuous blast chamber. After blasting, the six and eight cylinder heads are sent through special grinding machines for facing. They are placed on flat topped apron conveyors for further chipping, hand grinding and inspection.

Clutch housings, manifolds and transmission cases on another conveyor line pass in front of another row of tumbling barrels backing up against the row just mentioned. Manifolds and transmission cases are removed and placed in the barrels while the clutch housings move across the room to be vibrated, abrasive blasted, chipped, ground and inspected.

Two other conveyor lines carrying numerous small castings such as bearing caps, water pumps, gear blanks, transmission case covers, etc., travel adjacent to two tumbling barrel lines comprised of 18 barrels each, mounted back to back. Elevated



Heads for cylinder blocks are chipped, ground and inspected on this roller conveyor



All of the small castings are cleaned in a bank of 52 tumbling barrels arranged in six rows

hoppers are located above each line with belt conveyors down to centers. Small castings are removed from the conveyor lines and placed on the belts where they are sorted and distributed to various hoppers. Castings from the hoppers are dropped into the tumbling barrels.

While most of the castings cleaned by tumbling are ready for shipment for machining after inspection, certain ones such as manifolds, pump bodies and gear blanks containing pockets hard to clean by tumbling, are blasted. Manifolds are blasted in a continuous type barrel unit while the others are blasted in a batch type tumbling unit.

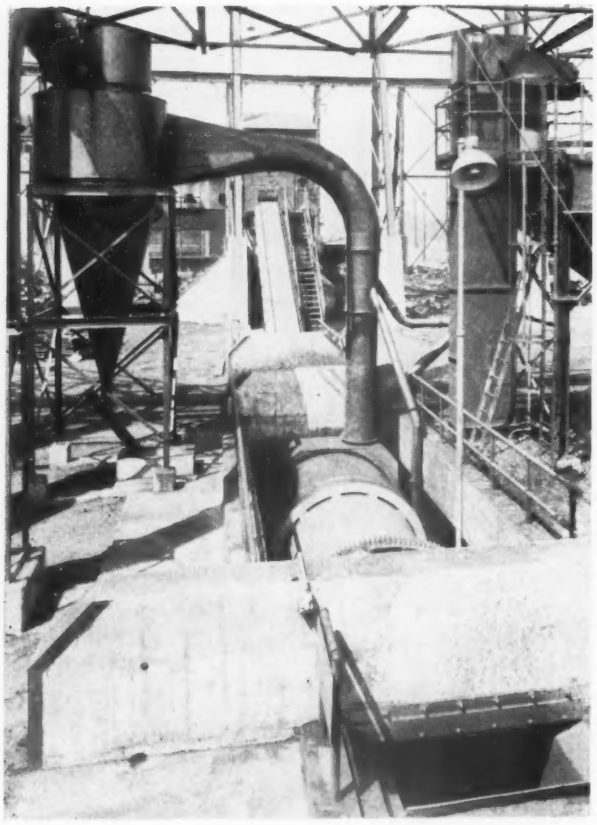
All vibratory grid units, abrasive blasting equipment and tumbling mills are connected to powerful exhaust systems, which carry the dust through seven wet dust collecting units. Each unit has a capacity of 26,000 cfm. Ventilation of the cleaning room is through ductwork having openings distributed in various areas. Air is brought in from above the roof by two fans, each of which supplies 80,000 cfm of air to the system.

Sand Is Reclaimed—Sand from the vibratory grids and tumbling mills drops through gratings and chutes into the basement and onto conveyor belts. Magnetic pulleys at the ends remove any iron, and the sand is discharged into sumps where it is mixed with water and pumped to the reclamation department.

Gates and sprues from the molding shakeout units drop into chutes leading to the basement and into containers mounted on skids or feet. Filled containers are picked up by fork trucks and taken through a tunnel and up a ramp to a sprue mill located about 300 ft from the building. The sprue mill, about 8 ft in diam and 30 ft long, is in an open concrete pit just below the ground level. Sprue is dumped in a chute at one end, and the cleaned material emerges from the opposite end where it drops onto an inclined conveyor. The material is elevated above an intervening roadway and across to the storage yard.

Dust generated in the cleaning operation is exhausted into a cyclone type arrester. Sand from the mill drops into the boot of an elevator which discharges onto an elevated conveyor belt. The latter transports the sand a short distance and dumps it into either of two elevated hoppers, from which it is trucked away for disposal.

Cylinder block and head castings having slight defects in noncritical areas are salvaged by oxy-acetylene gas welding in a room 35 x 45 ft in the southwest corner of the cleaning department. Castings are placed in an oil-fired furnace 10 ft wide and 25 ft long and preheated to about 1175° F. Castings are pushed in one end of the furnace and emerge at the other onto a roller conveyor, which transports them to any of the several welding stations. After welding, the castings are placed on skids, allowed to air cool, and then transported to the respective inspection benches.



Sprues and risers are cleaned in this sprue mill about 300 ft from the foundry building

Wood patternmaking department is fully occupied with maintaining present equipment and making patterns for replacement parts that can be made in the jobbing foundry

PATTERNMAKING . . . LABORATORIES . . . MAINTENANCE

PATTERNMAKING department at Chevrolet Tonawanda Foundry is located on the second floor, over the maintenance department. It includes wood and metal departments, tool crib, stock room, storage areas for wood and metal patterns as well as lumber and raw materials, welding booth, plaster booth and a pattern-drafting and supervisor's office.

About 80 men are employed on three shifts in the metal department with prime responsibilty for maintaining foundry and coreroom pattern equipment. The shapers, planers, lathes, milling machines, presses, grinders, screw machines and other related equipment are of recent design and of sufficient capacity to handle any pattern maintenance or repair job encountered.

The wood pattern shop employs nine journeymen and is fully occupied with maintaining present equipment and making patterns from which replacement parts for equipment now in use can be made in the jobbing foundry. Patterns also are made for parts to modify existing equipment to meet specific changes in production requirements.

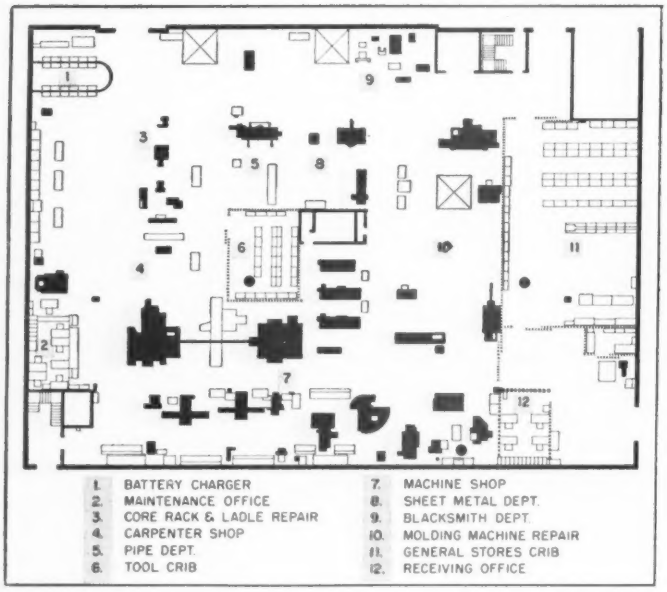
Maintenance Operations Are Extensive—Maintenance department occupies about 24,000 sq ft on the ground floor east of the cleaning room and adjacent to the cafeteria. It provides adequate floor space for the many machine tools necessary to assure that the foundry and its varied equipment is kept running to meet production schedules. About 330 men are deployed in various crews to meet the continual repair emergencies encountered.

Crews of millwrights, electricians, welders, plumbers, pipe fitters, carpenters, painters, and

PATTERNMAKING LABORATORIES MAINTENANCE

Bench side of metal patternmaking department that maintains foundry and corerocm pattern equipment and has capacity to handle any maintenance or repair job encountered

Sand control laboratory contains miscellaneous instruments essential to performing a multitude of tests on molding and coreroom sands before and during production runs



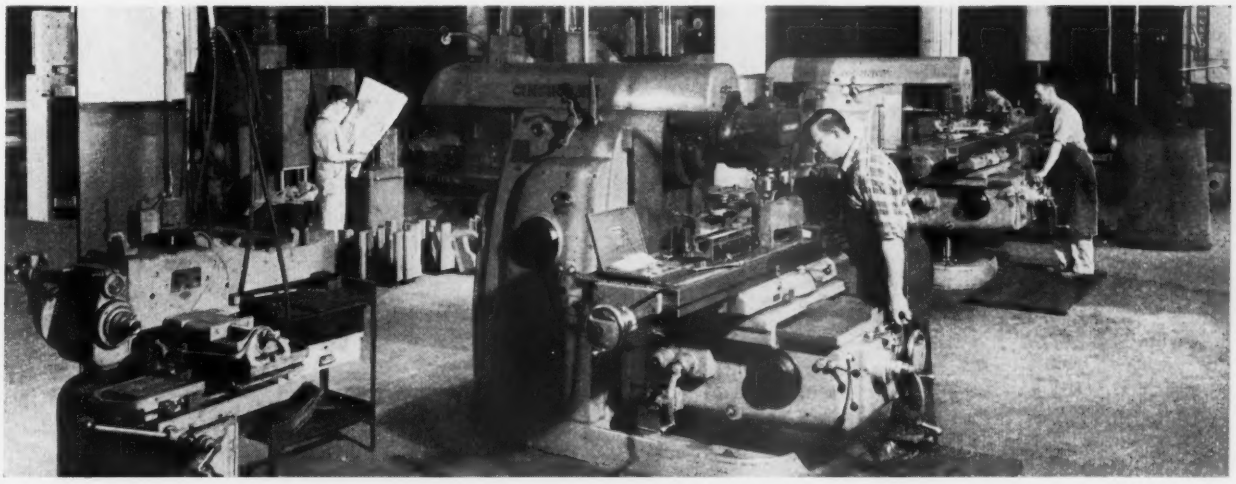
General layout of maintenance department highlighting the locations of various subsections

mechanics are assigned responsibilities in all of the production departments to make running repairs on molding and core machines, conveyors, scales, cranes, metal carriers, ladles, cupolas, shakeouts, belts, chains, motors and in-plant trucks. General repair and construction duties are performed when need arises. Machinists, bench and floor men, blacksmiths, tool and flask repairmen work in the maintenance shop to assist in maintaining the buildings and equipment. A yard crew maintains railroad tracks, switches, locomotive yard crane and other outside equipment.

Inspection department is located in the southeast corner of the cleaning room. Practically all inspection operations are visual and are performed on the various production lines while work is in process. Four brinell hardness tests are made each hour on each conveyor line to check for compliance with hardness specifications. The department checks all patterns and cores for conformance with blueprint dimensions.

Laboratories Are Well Equipped—Sand labora-

Laboratory in the forge building performs spectrographic, metallographic, chemical analysis, physical property tests and thorough raw material analysis for the foundry

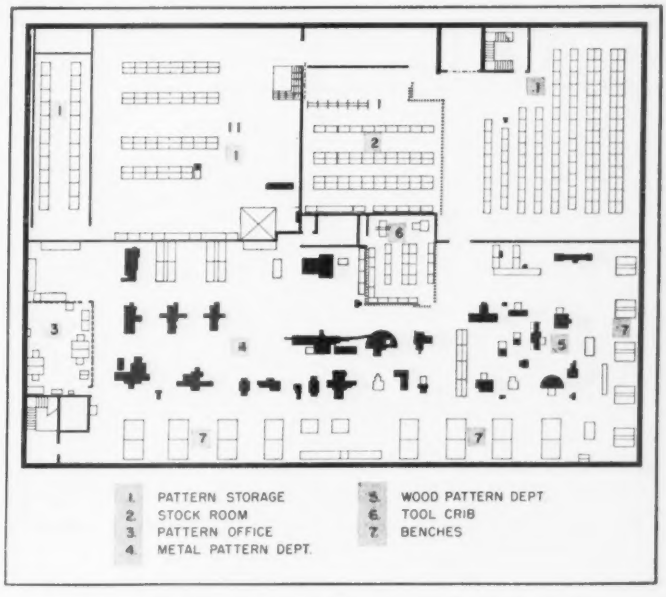


View shows one corner of the maintenance department that contains the machine tools necessary to meet demands of repair service encountered in such a large operation

tory is located at the west end of the molding department and contains the necessary equipment to perform green and dry strength, moisture, permeability, flowability, pH, shear, compression, deformation, carbonaceous content and similar tests on sand in the molding and coremaking departments.

Grain fineness, distribution and clay content are checked weekly on each molding line. Seacoal in molding sand is sampled three times each shift, flowability and deformation once each shift. Baked core sand mixes are checked against plain linseed oil sand mixes for tensile strength. Cores baked at various temperatures also are checked for strength differences. Cupola ganister mixtures are checked for percentages of clay, ganister and sand. Determinations are made regularly on core paste strength as well as cleaning room abrasive shot. Slurry mixtures are analyzed for solids.

A well-equipped laboratory in the forge serves the foundry and performs spectrographic, metallographic, complete chemical analysis and physical property tests for the foundry. Cupola samples are analyzed hourly and information telephoned to cupola office if changes in metal are required. Castings are picked at random from production lines and checked metallographically for hardness, section size, and cooling rate. Brinell hardness tests, chill depth checks and analysis of test bars are included in regular procedures. All complaints from various departments are run down to find source of difficulty. All raw materials, including pig iron, alloys, limestone, coke and coreroom materials, are thoroughly analyzed before use for conformance to set standards.



Layout of wood and metal patternmaking departments showing adjacent pattern storage areas

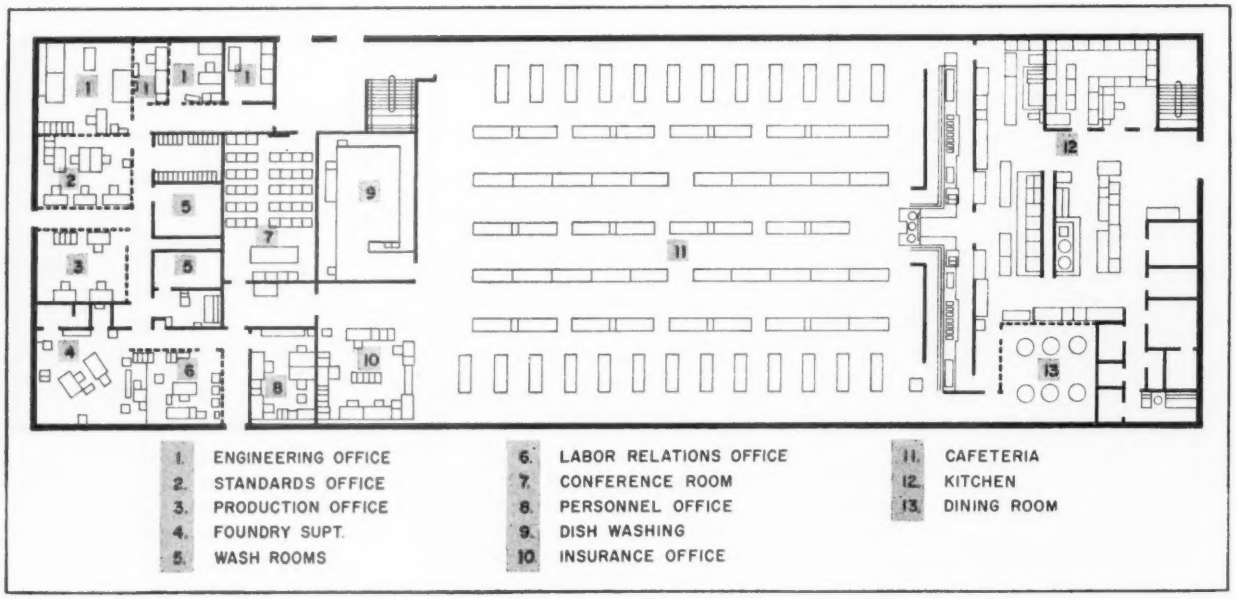
MISCELLANEOUS FACILITIES

Modern first-aid room is designed to treat all employee injuries, whether slight or serious

A MODERN cafeteria, fully equipped to prepare all the food it dispenses—with the exception of bread—is located on the ground floor at the southeast corner of the main building at the Chevrolet foundry. Seventy-five tables provide seating for 600 persons. An additional 35 foremen, supervisors or management personnel can be accommodated in an adjacent dining room.

Company regulations require that all meals be consumed in the cafeteria. Employees are permitted to take their own lunches to this area whether or not any additional food is purchased. During prescribed meal periods, employees eat at 15-minute intervals. A complete menu is offered for two shifts and a partial menu is available to third-shift employees.

Locker, shower room and toilet facilities are located in the basement under the office and cafeteria area. Individual ventilated lockers are provided in addition to showers, footbaths and wash fountains. Individual lockers for 1741 hourly employees, 146 supervisory personnel and 50 women are available. An underground tunnel provides access to and from an outside parking lot. Coreroom



Management, production, engineering, employee relations and personnel offices are closely integrated on the ground floor at the southeast corner of the main building

Employees can take their lunches to the cafeteria whether or not they purchase any additional food. Seating is provided for 600 persons. A nearby dining room seats 35

employees use an underground passage from the locker rooms to their department. It eliminates walking through other production departments to get to appointed work stations.

Safety Facilities—The first-aid room, located on the west side of the building near No. 5 and 6 molding conveyor lines, is surgically equipped to treat any kind of an injury, no matter how slight or how serious. A doctor and six full-time nurses staff the facility during all hours that production is scheduled.

From an adjacent room, the safety director supervises issuance of safety shoes, goggles, glasses, helmets, leggings, gaiters, shields, screens or other protective items. Goggles or glasses are issued free to all employees on a tool crib check. Safety shoes are available at reduced prices.

Eighteen oil tanks of 24,722 gal capacity each are located in an underground storage area about 1500 ft southeast of the foundry. Four of these tanks supply fuel oil for foundry process heating; the others contain fuel oil and quench and heat treat oil for the company's nearby forge operation. Delivery to tanks is by tank truck or from railroad

One of several washroom and shower facilities located convenient to employee locker rooms. Wide corridors aid traffic flow from production areas during shift changes

MISCELLANEOUS FACILITIES

tank car on an adjacent railroad siding. Oil is pumped from tanks to point of use by electric motor pumps located in an above-ground pump house. Oil travels through 4-in. pipe lines to the foundry at a constant 80-lb pressure.

A propane tank, also in this immediate vicinity, provides propane vapor for pilot lights, gas atmosphere work, and to burn-off excess gases in the cupolas before emission to the atmosphere.

An oil and gas building is located about 300 ft west of the fuel oil storage area. Two above-ground tanks inside the building contain 12,000 gal each of core oil that is pumped through a continuous, recirculating system to the foundry. Outside and underground are two additional tanks of like capacity—one for kerosene, the other for gasoline. Kerosene is piped to the coreroom for use as a release agent. Gasoline is used in materials handling and other vehicles.

Process water used in the foundry is obtained from a water intake and pumped directly from the Niagara river, about one-half mile distance. A network of underground storm sewers carries storm water directly to the Niagara. Sanitary sewage is collected in a septic tank and is treated before being returned to the river. All other water used in the foundry is processed through the sludge removal system.

Reuse Most of the Water—Water used in the sand reclamation system is pumped alternately into either of two 225,000-gal settling tanks. Water remains here about 1 hr before it is allowed to flow by gravity through an 18-in. pipe to the system's redistribution well. While in the settling tanks, solids in suspension settle to the bottom and are removed by clam shell bucket and loaded on trucks for disposal. As water flows from one settling tank, the other remains undisturbed to allow the settling action to take place.

The redistribution well receives water from the settling tanks at about 1800 gpm. Of this water about 1500 gpm is recirculated untreated in a closed system back through the foundry and about 300 gpm is treated chemically and returned to the Niagara river through normal sewage.

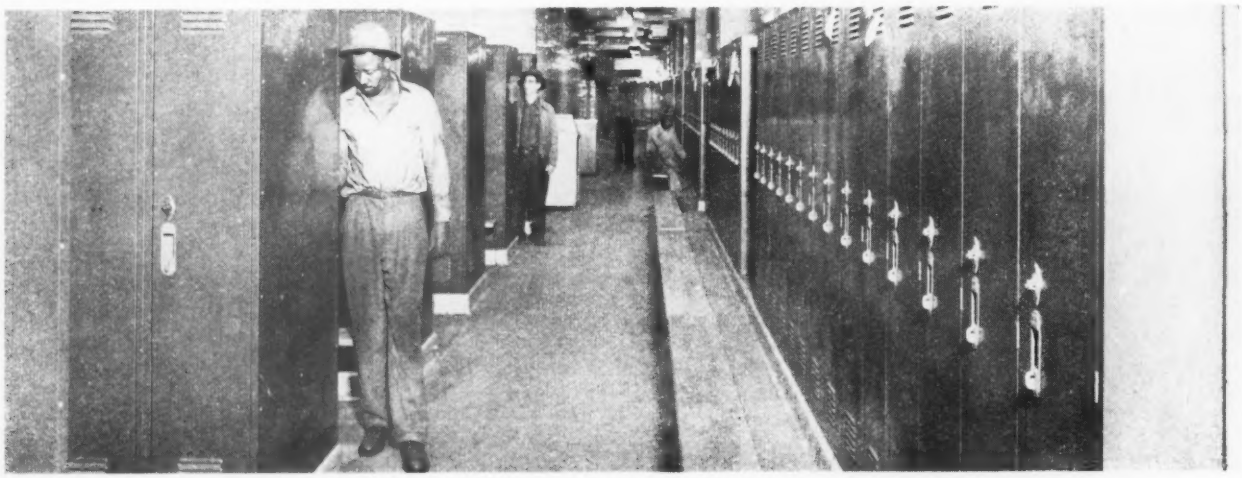
Water to be treated flows into a 225,000-gal clarifier where about 200 parts of lime is added to 1 million parts of water. Overflow from the clarifier spills into an influent basin where an additional 200 parts per million of alum is added. The pH factor is kept in a range from 6½ to 8½ to cause agglomeration of the particles in suspension and promote settling at the bottom. Sludge is pumped from the bottom of the tank while scum is removed from the top with power-driven scum boxes.

From the influent basin the water flows to a flotation unit where it is further treated with a coagulant aid in conjunction with a Sveen-Pedersen unit. Settled sludge in the flotation unit is pumped to the second floor where it is recovered and dropped down chutes to trucks for disposal. After treatment, water contains less than 50 parts per million of solid material.

A large power house, located to the west of the foundry, includes a battery of coal and stoker-fired boilers and motor and steam-driven air compressors to provide steam and compressed air for the foundry. Capacity of the boilers is 390,000 lb per hour while the air compressors produce 24,000 cfm. Four compressed-air boosters increase line air pressure from 90 to 125 psi at 1000 cfm each.

Electric power is purchased commercially and delivered to the foundry through a substation from overhead lines and is transformed to 13.2 kv for distribution. Motor voltages are basically 440 v, 3-phase, 60-cycle. Direct current at 120 and 240 v also is available throughout the plant.

An acetylene generator manufactures and pumps acetylene to several take-off points in the maintenance, pattern shop, coreroom, electrical repair and casting repair departments.



Individually ventilated lockers for 1741 hourly employees, 146 supervisory personnel and 50 women are provided in basement location under the office and cafeteria area

EQUIPMENT SUPPLIERS

... For the Chevrolet Tonawanda Foundry

Air Reduction Sales Co., New York ..... *Cylinder trucks*
Ajax Flexible Coupling Co., Westfield, N. Y. ..... *Conveying equipment*
Alemite Co. of Buffalo Inc., Buffalo .... *Lubrication systems*
All-State Patterns, Detroit ..... *Patterns*
American Air Filter Co., Louisville, Ky. ..... *Dust collectors*
American Well Works, Aurora, Ill. ..... *Sludge removal equipment*
Anchor Steel & Conveyor Co., Dearborn, Mich. ..... *Monorail conveyors*
Annex Pattern Works, Detroit ..... *Patterns*
Automatic Transportation Co., Chicago ..... *Tow tractors*
Automotive Pattern Co., Detroit ..... *Patterns*

William M. Bailey Co., Pittsburgh .... *Pig casting machines*
Baker-Perkins Inc., Saginaw, Mich. ... *Sand mixer, paste mixer and dissolver*
C. O. Bartlett & Snow Co., Cleveland ..... *Sand and mold handling systems, coke charger, sprue mill, sand dryer system*
Beals McCarthy & Rogers, Buffalo ..... *Belt sander*
Blaw-Knox Co., Pittsburgh ..... *Clam-shell bucket*
Buffalo Forge Co., Buffalo ..... *Metalworking machine*
Buffalo Scale & Mfg. Co., Buffalo ..... *Scales*

Caterpillar Tractor Co., Peoria, Ill. ..... *Tractors*
Central Pattern & Machine Co., Saginaw, Mich. ..... *Core plates, automatic strikeoffs, patterns*
Chisholm-Moore Hoist Division, Columbus-McKinnon Chain Corp., Tonawanda, N. Y. ..... *Telescopic portable crane*
City Pattern Foundry & Machine Co., Detroit ..... *Patterns*
Clark Equipment Co., Battle Creek, Mich. ..... *Fork trucks, truck tractors*
Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O. ..... *Electric hoists and tramrail*
Commerce Pattern & Engineering, Walled Lake, Mich. ..... *Patterns*
Convey-All Corp., Mansfield, O. ..... *Belt conveyors*
Copperweld Steel Co., Glassport, Pa. ..... *Briquet machine*
Cutler-Hammer Inc., Milwaukee ..... *Controls*

Delco Products Division, General Motors Corp., Dayton, O. ..... *Motors*
William Demmler & Bros., Kewanee, Ill. ..... *Coreblower*
Despatch Oven Co., Minneapolis ..... *Ovens*
Detrex Corp., Detroit ..... *Degreasers*
Harry W. Dietert Co., Detroit ..... *Sand laboratory equipment*

DoAll Co., Des Plaines, Ill. ..... *Sawing, filing and polishing machine*
Dracco Corp., Cleveland ..... *Pneumatic system*

Thomas A. Edison Inc., West Orange, N. J. ..... *Batteries*
Eimco Corp., Palatine, Ill. ..... *Steel drum filters*
Electric Controller & Mfg. Co., Cleveland ..... *Magnets*
Elwell Parker Electric Co., Cleveland ..... *Electric trucks*

J. N. Fauver Co., Detroit ..... *Lubrication equipment*
August Feine & Sons Co., Buffalo ..... *Dump buckets*
Fisher Scientific Co., Pittsburgh *Sand laboratory equipment*
Flinn & Dreffein Engineering Co., Chicago ..... *Casting preheat furnace*
Foundry Equipment Co., Cleveland ..... *Core ovens*
Foundry Flask & Equipment Co., Northville, Mich. ..... *Steel flasks, checking and loading fixtures*
Freeman Supply Co., Toledo, O. ..... *Leverage press, sander, band saws*
Frigidaire Sales Corp., Division of General Motors Corp., Dayton, O. ..... *Air conditioning units*

Gardner Machine Co., Beloit, Wis. ..... *Grinding wheels*
Gogan Machine Corp., Cleveland ..... *Hardness testers*
Goulding Mfg. Co., Saginaw, Mich. ..... *Core machines*
Grindle Corp., Harvey, Ill. ..... *Cupolas, scale cars*

Hapman Conveyors Inc., Kalamazoo, Mich. .... *Conveyors*
Harnischfeger Corp., Milwaukee ..... *Overhead crane*
Hauck Mfg. Co., Brooklyn, N. Y. ..... *Oil burners*
C. I. Hayes Inc., Providence, R. I. ..... *Electric heat treating furnace*
Hertner Electric Co., Cleveland ..... *Battery charging equipment*
Hill-Acme Co., Cleveland ..... *Portable floor crane*
Hohl Industrial Sales Inc., Buffalo ..... *Monorails and rail switches*
Frank G. Hough Co., Libertyville, Ill. ..... *Front end loader*
Hydro-Blast Corp., Chicago .. *Sand reclamation equipment*
Hyster Co., Portland, Oreg. ..... *Mobile crane*

Industrial Brownhoist Corp., Bay City, Mich. .. *Diesel crane*
Industrial Equipment Co., Minster, O. ..... *Girder crane*

EQUIPMENT SUPPLIERS

Ingersoll-Rand Co., New York ..*Hoists, booster compressors*
Inland States Mfg. Co.,
Detroit ..... *Core loading and unloading equipment*
International Molding Machine Co.,
LaGrange Park, Ill. ....*Mold and coreblowing machines*

Jeffrey Mfg. Co., Columbus, O. .....*Vibrating feeders*

Kane & Roach Inc., Syracuse, N. Y. .....*Wire straightener*
Walter Kidde & Co., Belleville, N. J. ...*Fire extinguishers*
Kirk & Blum Mfg. Co., Cincinnati .....*Dust collectors*
George Koch Sons Inc.,
Evansville, Ind. .....*Cooling court ventilation*
Koehler Bros. Steel Works, Saginaw,
Mich. .....*Stands and pushers*

Lake Erie Foundry Co., Buffalo .....*Slag buggies*
Leeds & Northrup Co.,
Philadelphia .....*Sand laboratory equipment*
Lincoln Electric Co., Cleveland ..... *Arc welders*
Link-Belt Co., Chicago
Slag handling system, pivoting slag chute and traveling dewatering screen, core department floor sweeping system, coke and limestone handling system, screw conveyor system, ganister system, jobbing and lacing sand system
Lyon Metal Products Inc.,
Aurora, Ill. *Lockers and benches, work benches, bar racks*

Maday Body & Equipment Corp., Buffalo .....*Car pullers*
R. C. Mahon Co., Detroit .....*Vertical core ovens*
Manning, Maxwell & Moore, Muskegon, Mich. .....*Cranes*
Marietta Concrete Corp.,
Marietta, O. ..... *Concrete storage silos*
Master Pneumatic Tool Co., Bedford, O. ...*Portable tools*
Carl Mayer Corp., Cleveland .....*Core ovens*
Mercury Engineering Corp.,
Milwaukee ..... *Conveyorized grinding lines*
Minneapolis-Honeywell Regulator Co., Philadelphia
Potentiometers, thermocouples, sand laboratory equipment
Modern Equipment Co., Port Washington,
Wis. ..... *Overhead monorail cranes, ladles*
Morris Machine Works, Detroit .....*Slurry pumps*

National Engineering Co.,
Chicago .... *Sand handling and preparation system*
National Foundry Sand Co., Detroit .. *Cupola lining guns*
Wm. H. Nichols Co., Richmond Hill, N. Y. *Molding machines*

Oliver Machinery Co., Grand Rapids,
Mich. .... *Lathes, planer, jointer and tool grinder*
Osborn Mfg. Co., Cleveland .....*Molding machines*

Pangborn Corp., Hagerstown,
Md. ..... *Casting cleaning equipment*
Peerless Pattern Works, South Bend, Ind. ..... *Patterns*
Parmenter Steel & Conveyor Co.,
Detroit ..... *Monorail system, sand carriers*
Planet Corp., Lansing, Mich.
Conveyors, waste sand system, tumbling mill hoppers and grating, infrared drying oven, briquet plant equipment, knockout system
Proportioneers Inc., Providence, R. I. *Wetting agent system*
Pyle Pattern & Mfg. Co., Muskegon Heights, Mich. *Patterns*

Pyrometer Instrument Co.,
Bergenfield, N. J. .....*Optical pyrometers*

Queen City Sand & Supply Co.,
Buffalo .....*Sand laboratory equipment*

Rapistan of Michigan Inc., Grand Rapids, Mich. *Conveyors*
Robinson Air-Actuated Conveyor Systems,
New York .....*Pneumatic conveying system*
J. O. Ross Engineering Corp.,
New York .....*Horizontal core ovens*
Rotor Tool Co., Cleveland .....*Portable tools*

Sage Equipment Co.,
Buffalo .....*Roller conveyors and monorails*
Saginaw Machine & Tool Co., Saginaw, Mich.
Molding machines, core machines, water testing machines
Saginaw Pattern & Mfg. Co., Saginaw, Mich. .....*Patterns*
Saginaw Welding Supply Co., Saginaw,
Mich. .....*Acetylene generator*
Schmieg Industries Inc., Detroit
Sawdust exhaust system, floor hoppers, hopper chutes, loading ramps, ventilation system, compressor bases, dust and fume eliminators

Claude B. Schneible Co.,
Detroit .....*Shakeout hoods, duct work, ventilation equipment*
Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y. .....*Hot metal carriers*
Simplicity Engineering Co., Durand, Mich. .....*Shakeouts*
W. W. Sly Mfg. Co., Cleveland
Tumbling mills, blast cabinets, core sand reclaiming mills
Standard Conveyor Co.,
North St. Paul, Minn. .....*Conveyors*
Standard Electric Tool Co., Cincinnati .....*Grinders*
Stork Engineering Co., Saginaw, Mich.
Core plates, flask straightening press, flasks, molding machines, pasting machines, spray machines, tumbling mill covers, squeeze head racks, pinion supports and hydrometer supports
Stroman Furnace & Engineering Co.,
Franklin Park, Ill. .....*Melting furnaces*
Sutter Products Co.,
Dearborn, Mich. *Core blow, squeeze and draw machines*
Superior Pattern & Mfg. Co.,
Detroit ..... *Sand reservoirs, patterns*
Sveen-Pedersen Sales, Long Island City,
N. Y. .....*Sludge removal equipment*

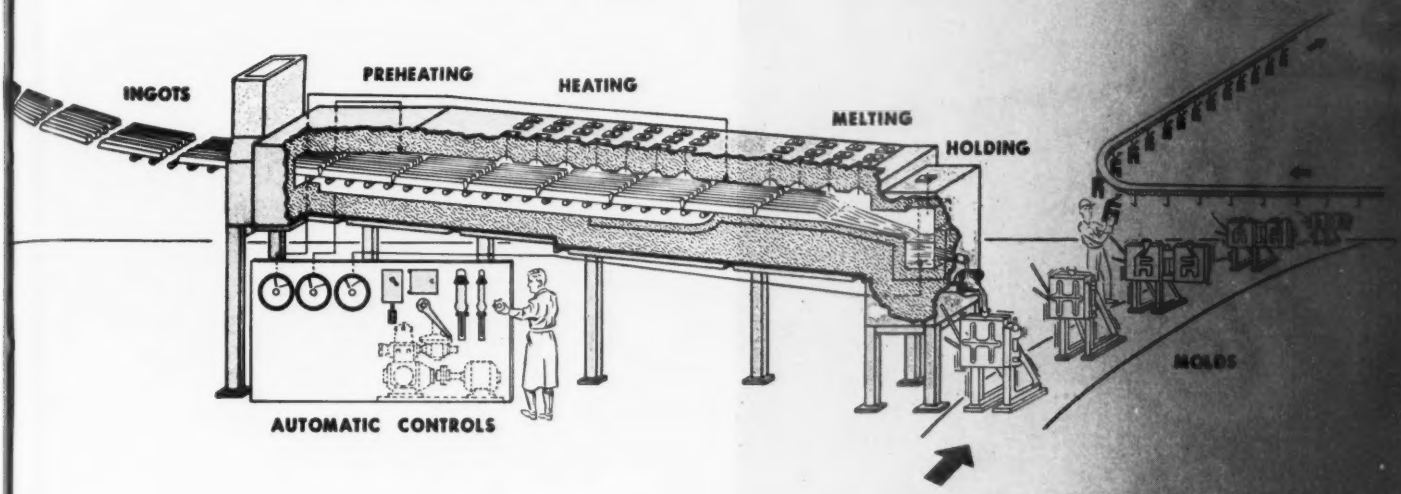
Tabor Mfg. Co., Philadelphia .... *Core and mold machines*
Tomkins Johnson Co., Jackson, Mich. .....*Air cylinders*
Towmotor Corp., Cleveland .....*Tractors*
Toledo Scale Co., Toledo, O. ..... *Scales*
Tupes of Saginaw, Saginaw, Mich. .....*Arc welders*
Turner Bros. Inc.,
Ferndale, Mich. .....*Hydraulic testing equipment*

Union Metal Mfg. Co.,
Canton, O. ..... *Tote boxes, skid boxes, skid platforms*

Walsh Metal Products Inc., Detroit
Core storage units, dump buckets, core carriers, core drying oven
Wayne Pattern Works Detroit ..... *Patterns*
Webster Mfg. Co., Tiffin, O. *Belt conveyor and spray hood*
Wells Mfg. Co., Three Rivers, Mich. ..... *Band saw*
West Michigan Steel Foundry Co.,
Muskegon, Mich. .....*Flasks, patterns*
Wheelabrator Corp.,
Mishawaka, Ind. .....*Casting cleaning equipment*
Whirl Air Flow Corp.,
Chicago *Transporter and pneumatic conveyor system*
Whiting Corp., Harvey,
Ill. *Charging crane, seacoal crusher and handling system*
Wilson Mechanical Instrument Division, American
Chain & Cable Co., New York .....*Hardness testers*
Wolverine Pattern Co., Saginaw, Mich. ..... *Patterns*

Yale & Towne Mfg. Co.,
Philadelphia ..... *Hoists, platform trucks*

Diagram showing general arrangement of continuous melting furnace and molds. In installation described here, ingots are pushed in one at a time



Automatic Casting of Aluminum Employs

Continuous Melting

New type of aluminum melting furnace can be heated up in less than three hours, melts ingots in 24 to 30 minutes and provides continuous supply of metal. Automatic pouring is used in conjunction with the melting unit

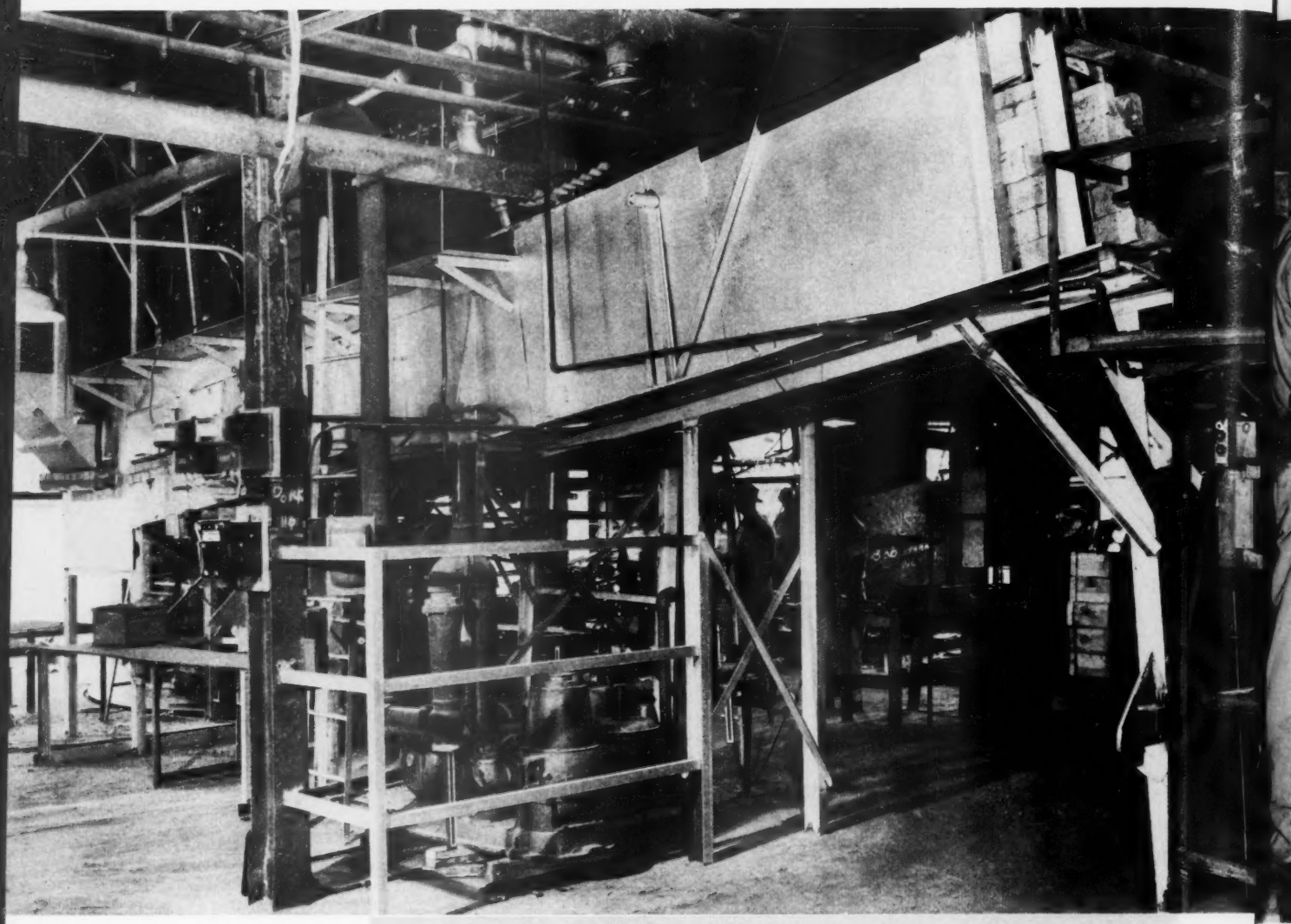
By JACK C. MISKE
Assistant Editor

CONTINUOUS melting and automatic pouring of aluminum alloys for casting have become a reality at Monarch Aluminum Mfg. Co., Cleveland. Basis of the automated operation is a tunnel-type furnace, in operation for over a year, which has made possible lower foundry overhead, close control of metal handling and casting quality and superior working conditions. Three of these units are currently in use at Monarch.

Designed to provide automatic, continuous melting, the furnaces employ Selas Corp. radiant gas burners operating at high temperature to effect fast, controlled heat transfer. Relatively small, yet with high capacity per hour, the furnaces slope downward from the input to the output end, about 2 in. per foot in units now in use.

Ingots Fed Automatically—Ingots are brought to the furnace, still baled, by lift truck. They are loaded by hand on a conveyor at the upper end and automatically are pushed lengthwise under the roof of burners. Succeeding ingots push through those already in the furnace until the oxide skin on them breaks; the molten metal goes the rest of the way by gravity. Melting rate and pouring temperature are controlled by regulation of the speed of ingot charging and by the fuel input to the burners.

Molten aluminum flows continuously through an opening near the lower end of the furnace, directly into a small pouring ladle. The cycle from cold to molten metal requires about 24 to 30 minutes. As the metal falls from the spout into the ladle, a constant coating or skin of oxide surrounds it until it enters the ladle. This oxide skin contracts or expands if the rate of flow changes. In Monarch's operation, the metal emerges on the left side of the furnaces, at the front end. A pyrometer in the ladle gives a constant check on



Side view of furnace, from nonpouring side, shows size and general construction. It's a pilot installation, built for use, not beauty, and much modified

melt temperature, which is controlled automatically.

Molds Mounted on Turntable—In front of the furnaces, and slightly to the left, permanent molds are mounted on turntables. In one installation, the molds are indexed to a position under the pouring ladle and are poured automatically. In another, the turntable revolves continuously, and molds are poured automatically as they enter the pouring zone. Because of the large variety of work poured with metal from the third furnace, molds are hand-poured from a small holding pot.

As a safety feature, the pouring ladle is designed so that when it is not pouring, the rear is lower than the pouring lip. Excess metal, if any, flows down a trough and into a small pot, from which it can be reclaimed. Electronic equipment on the indexing table makes it possible to pour molds with a 2 to 3-lb weight range consecutively, on the same turntable. A mechanical arrangement permits the same flexibility in mold size with molds on the continuously revolving turntable.

Although replacement of a pouring ladle during operating hours never has been necessary, the job could be done easily. Molten metal could be diverted into the small holding bath incorporated in the interior of the furnace, or charging could be halted long enough to permit the change, then resumed without further delay. If the direct-pour principle is not desirable from a production standpoint, alternate designs embody provisions for a limited holding pot or the use of transfer ladles.

In the construction of the furnace, 60 burners in four rows of 15 each are patterned to form a radiant roof 10 ft long and 3 ft wide over the final one-third of ingot travel. Natural gas and air are fed to the cup-shaped burners in accurately controlled proportions and under controlled pressure. The mixture is burned within the cups and heats the ceramic lining to incandescence. Heat transfer between the cups and the aluminum charge quickly brings the ingots to the melting point, largely by radiation. Combustion products provide preheat during the first two-thirds of ingot travel.

Man at left loads ingots on conveyor, and automatic pusher propels them into the furnace. Man at pusher is inspecting a new unit, not acting as operator

Reducing Atmosphere — Since the oxygen required for combustion is supplied to the burners in the air-gas mixture just mentioned, none is required in the furnace itself. The unit therefore operates in a slightly reducing atmosphere which may be varied to some extent by changes in the mixture.

Oxides do not form because the only aluminum in the furnace in a fully liquid state is in the immediate vicinity of the pour point. When fed into the furnace, however, each ingot already is covered with an oxide coating.

This coating does not melt, but is skimmed off by a cofferdam-like arrangement before the molten metal reaches the small (50-100 lb) holding bath through which all metal passes on its way to the pouring spout. The shallow holding bath is designed for flexibilty. In the event that a mold is pulled from the turntable temporarily after charging is in progress, metal can be held in the bath long enough for the adjusted charging rate to hit the spout. The furnace operator removes the collected oxide at his convenience perhaps two or three times per shift, from a door in the right side of the furnace.

A feature of the continuous melting furnace is simplified operation. Bringing the startup charge to pouring temperature requires less than 3 hr. Once operating temperature has been reached, the charging rate is set to meet the demand. Fuel flow is adjusted to achieve the desired pouring temperature as the oxide envelope on ingots is pierced. Four, five or six ingots, depending on furnace size, are charged every five to ten minutes, but exact timing is not critical if suitable loading equipment is provided. Once the operation has been stabilized, the production rate is controlled by adjustment of the charging equipment.

Aids Quality Control—Quality control also has proved to be one of the major features of the furnace. Castings are reported to be of the same analysis as the ingots from which they are poured and to be reproducibly uniform from casting to casting. Intermediate alloys can be obtained by mixing ingots of different composition and different size in the same charge. Ingots used at Mon-

arch range in weight from 30 to 60 lb.

When one run ends, the alloy can be changed to meet the requirements of the next run while the furnace still is in operation. Ingots to meet the new specifications are loaded in time for them to reach the pouring stage as the new molds are placed in service. Simplicity of the process permits several alloy changes per shift while nearly full production is maintained.

Apart from analysis, the general quality of of the castings is said to have been improved significantly. The short heating cycle does not hold the aluminum long enough for dross to form, and gas absorption is virtually nonexistent. Aluminum melted in the furnace is not degassed, although it could be if the need arose. Occasionally, Monarch finds it necessary to add gas to prevent shrink. Grain structure in castings also is said to show close uniformity.

A further major advantage of the new furnace involves improved working conditions. First, it can eliminate the summer drop in production caused by high temperatures, for the heat is enclosed completely. With the exception of two or three spots such as the pouring point and the oxide cleanout, the outside of the furnace is cool to the touch; and there is no need to hold large quantities of metal at or near pouring temperature.

Because of improved working conditions, labor turnover can be reduced, eliminating the need to train new crews each fall. In this area, the gain is twofold: Training expenses are cut, and the experience of seasoned, skilled employees further increases production. In addition, it becomes possible to acquire and keep workers of higher caliber than otherwise would be available.

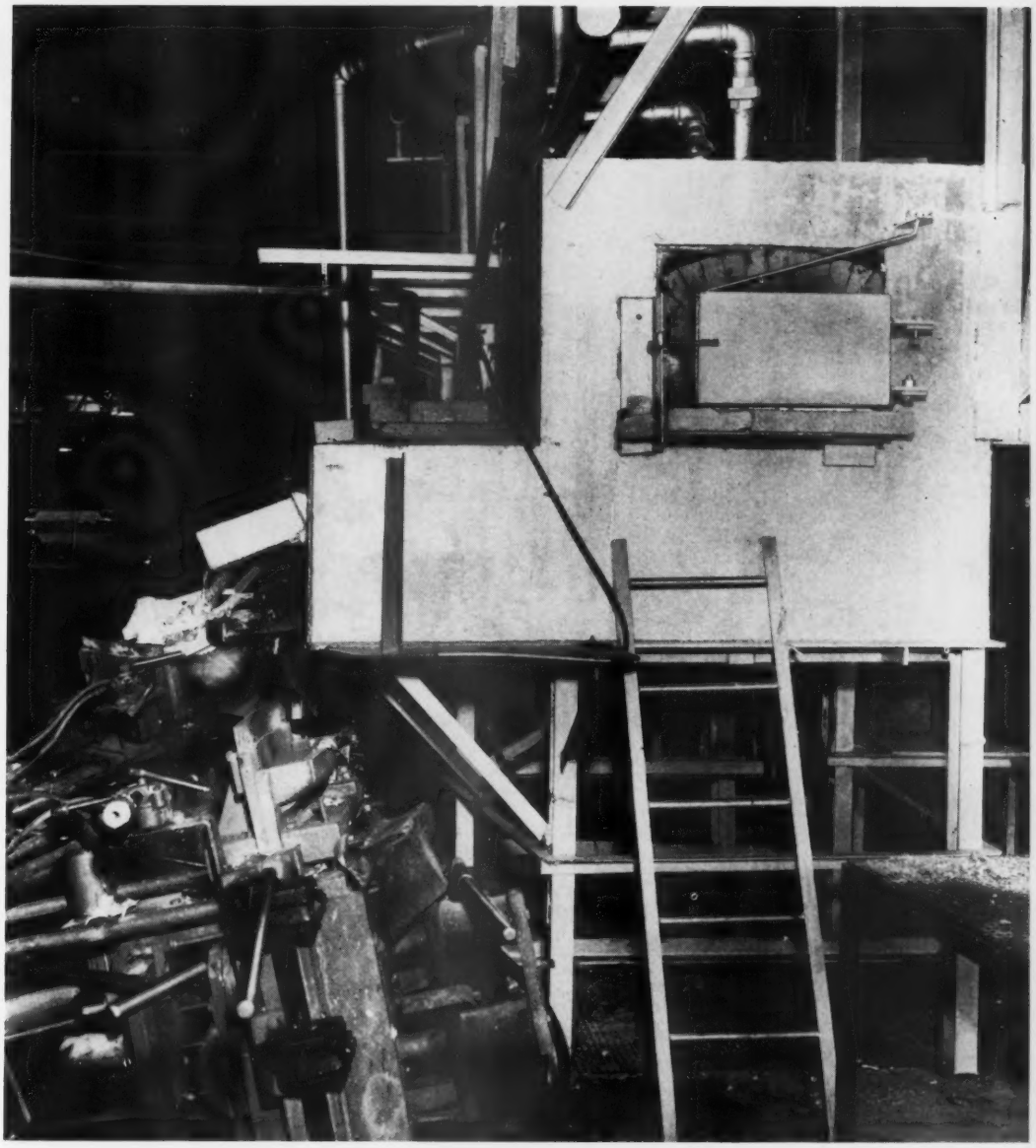
Beyond the actual reduction in costs, continuous melting provides a much closer control of costs. Direct costs of melting aluminum become very nearly proportional to the weight melted. Since no large holding bath is necessary, only about 1000 lb of metal is being processed at one time, at a 2000-lb per hour pouring rate, for example, and only a few hundred pounds of that quantity actually is molten. Small furnaces for low production rates become practical, and it is economical to start up a furnace of any size for even a short run.

The furnace can be shut down within minutes with only a few pounds of metal to pour off and a minimum of oxides to remove. If circumstances cause a production delay, the unit can be restarted and brought up to pouring temperature in less than an hour. Operated for two 8 or 10-hr shifts, the furnace can be closed down during third-shift mold maintenance periods and refired to melting temperature in a maximum of three hours before the start of the first shift on the next day. This period is dependent on the design of the furnace and heating capacity of the fire brick. Maintenance of the refractory lining is reported to be relatively simple and inexpensive.

Fuel Consumption Low — Fuel consumption is extremely low because there is no large reserve of liquid metal, and heating is controlled closely. Performance records at Monarch show an over-all gas consumption of 1.9 cu ft (about 1900 Btu) of gas per pound of aluminum melted.

Monarch now is using three continuous melting furnaces in the permanent mold casting room, with capacities of 1500, 1800 and 2400 lb per hour, rated at 1400° F pouring temperature. They have been operated at rated capacity — in fact, the largest has been modified to operate at a capa-

Left—Close-up shows how conveyor raises ingots to the pusher, which propels them into preheat section of the furnace. The next ingots push those ahead farther into the furnace until melting is finished

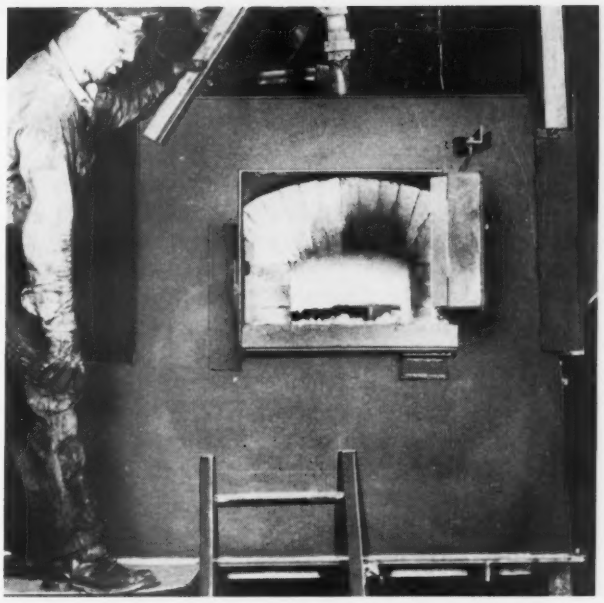


Right—Molten aluminum is falling into a small pouring ladle which pours the permanent molds automatically when the turntable indexes. Weight of successive castings can vary

city of well over 3000 lb per hour—and at as little as 60 per cent of capacity, without any appreciable decrease in efficiency. Apparently each furnace could be operated at a greater degree of turndown without increasing unit costs. The company has found no evidence that would indicate any limit to building similar furnaces in much smaller or much larger capacities.

The ultimate conversion of all its melting units to several versions of continuous melting furnaces is planned for Monarch's permanent mold foundry. Timing will depend on the life expectancy of present equipment. Designs also are being prepared for furnaces for the company's die casting department which will have a capacity of about 500 lb per hour.

The continuous melting furnaces were developed by J. H. Keating, vice president of manufacturing, Monarch, with the technical advice of Selas Corp. of America, Philadelphia, producers of the combustion equipment used in the units. They are to be made available to foundries working in aluminum and other low-melting-point alloys.



Observation port at pouring end of furnace gives view of the entire interior of the melting unit

Numerous Melting Techniques Used in New G E Metals and Ceramics Laboratory

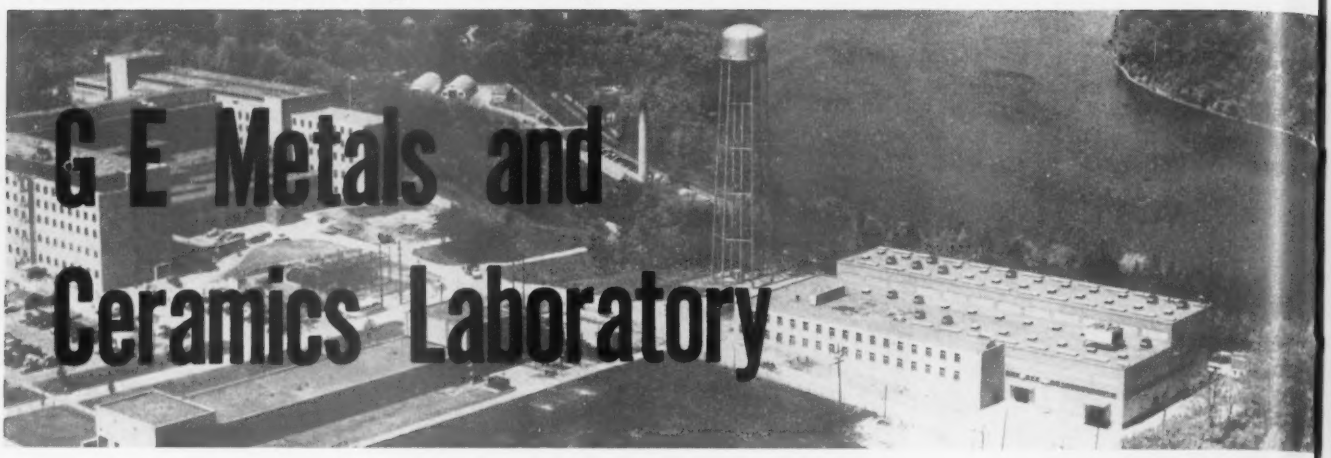


Fig. 1—New research laboratory on Mchawk River, near Schenectac'y, N. Y. Main building is left, radiation lab center, metals and ceramics lab right

By A. J. KIESLER and R. E. CECH
Metallurgy & Ceramics Research Dept.
General Electric Co., Schenectady, N. Y.

THE art of melting and casting metals has developed through the centuries to a remarkable state of achievement. The complex needs of mankind made necessary the improved and newly developed techniques to satisfy expanding requirements. All this progress was made by arduous trial and error. In the last few decades, however, the needs for improved and sometimes entirely different methods of melting and casting metals have completely outrun the ability of "trial-and-error metallurgy" to keep pace.

It is during this period that the science of metals has been applied to these phenomena. From fundamental studies of the melting and solidification processes have come findings which point the way to many improvements in techniques of melting and casting metals.

A weak link has existed, however, between the scientist, who learns new facts regarding the solidification of metals, and the metal producer, who needs to have this information translated into practical operating procedures before he can make use of it to produce metals with superior properties.

To strengthen this link the General Electric Co. has planned and built a Metals and Ceramics building as a part of its Research Laboratory in Schenectady, N. Y. The principal objectives to be accomplished in this laboratory are:

1. To ascertain and analyze the areas of most critical need for materials and processes.
2. To develop new processes for new businesses.
3. To develop new materials to improve products.
4. To study existing materials and obtain a better understanding of their properties and processing.
5. To operate pilot plants and obtain economic data.

To carry out the various research and development projects the laboratory makes use of more types of melting and casting equipment and techniques than could be found in any other laboratory in the world. A full complement of the "normal" types of melting equipment, ranging in size from tiny induction melting furnaces to a 1-ton basic electric furnace, satisfy many of the requirements of scientists in the laboratory. In addition, all of the newest developments in melting equipment such as the vacuum induction melting furnaces, consumable electrode arc-melting furnaces, atomic hydrogen melting furnace, zone-melting furnaces and many other types are being used in development work of an advanced nature.

Solidification Studies—This wide array of equipment stems from the methods used in attacking the problems attendant with the melting and solidification of metals. The development work being carried on has been preceded by fundamental research of great breadth and scope. One such area is the development of improved methods for controlling the structure and grain size of castings. The initial studies, conducted over several years and still continuing, were concerned with observing the behavior of completely pure metal during the solidification process. In these studies it was found that the controlling factor in determining how a metal solidifies is the extraneous matter or "dirt" contained in the metal. If the molten metal does not contain some dirt particles, it will not solidify even though it is below the melting point (the metal supercools). It would eventually solidify if supercooled far enough even though no

Fig. 2—Pouring "heat" from a 1-ton ladle. Arc furnace is in background

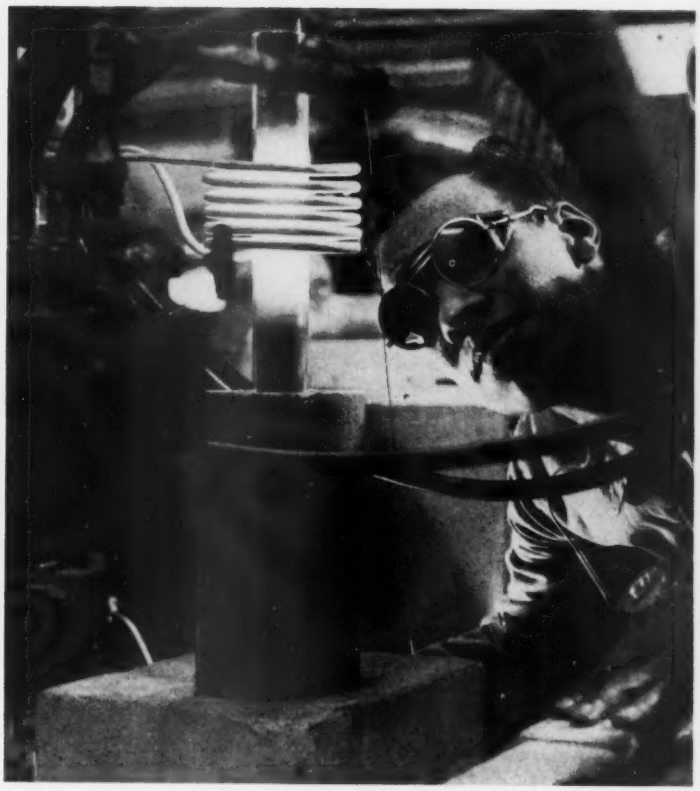


Fig. 3—In this illustration, researcher is watching the progress of a "floating zone" experiment

impurities were present.

When dirt-free metal is poured into a mold a columnar grain structure will result. This occurs because the dirt on the cold mold walls starts solidification of metal. When no other grains of solid metal start in the interior of the casting (no dirt there for starting them) the first grains will continue to grow inward until the entire casting is solidified.

To be effective in promoting solidification, the dirt particles must have atom spacings and configurations which closely approximate that of the metal. In effect, the liquid metal must be "fooled" into accepting the dirt particle as a solid piece of metal. When a solid dirt particle having the proper arrangement of atoms is in a bath of liquid metal below the normal freezing point, the metal reacts in the same manner as if the dirt were really a solid piece of metal. Solidification occurs simply by growth onto the dirt particle. If the dirt has an improper atom spacing, the liquid metal does not recognize it until the metal supercools a large amount below its normal freezing point. The more the metal supercools, the greater its desire to solidify, until finally (in desperation so to speak) it accepts the improper atom spacing dirt and grows onto it.

The research on solidification provides the background necessary to predict what materials will be most effective in promoting solidification. These predictions must then be tested by experimental work. First, using small induction furnaces, the most promising materials for refining the grain size of castings are selected. These are then tested on an industrial scale using the 1-ton arc furnace. In Fig. 2 is shown a heat from this furnace being poured into molds after having been inoculated with dirt particles. Results obtained using equip-

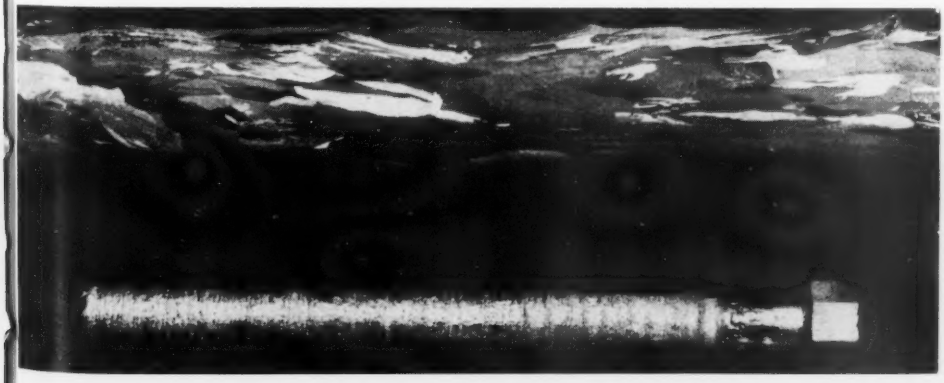


Fig. 4—Iron at top of illustration was purified by "conventional" methods of melting. At the bottom is chromium which was purified by "floating zone" melting

Fig. 5—Interior, multiple hearth arc melting furnace. Electrode tip and radiation cone are on cover

ment of this size can at once be duplicated on an industrial scale.

High-Temperature Alloys—An extensive effort is being directed toward the development of advanced types of high-temperature alloys for use in jet engines and rocket components. Here again the alloy development work is based directly upon the research being carried on in other parts of the laboratory.

In the first phase of the work, metal is purified to a remarkable degree by the technique known as "zone melting." In this process a bar of metal is melted at one end and then a seed crystal is introduced into the molten "zone." Pure metal solidifies on the seed crystal, thereby causing the impurities to be concentrated in the molten metal. The molten zone is passed slowly through the bar by moving the heat source. The impurities concentrated in the molten zone solifidy in the last portion of the bar. This portion is cut off, leaving a bar of high-purity metal.

With such highly purified metals it is possible to determine whether desirable properties can be attained in certain metals in the nearly complete absence of foreign atoms. Furthermore, the effect of carefully controlled small additions can be studied in the absence of complicating influences brought about by impurities. Research of this type has led to the development of many useful alloys in the past and it can be expected to continue to do so.

In the extension of this work to high melting point metals it has been necessary to carry out the process in the absence of a crucible. All crucible materials, though they are inert at lower temperatures, will give off impurities to metals at high temperatures. Zone melting on metals such as iron, chromium and titanium must therefore be carried on without a crucible. The technique by which this is done is known as "floating zone" melting. A rod of metal is held vertically in a vacuum system. A concentrated power source is applied to the rod, causing a small portion of the rod to melt. Surface tension of the molten metal holds it in place between the two solid portions of the rod. Purification is accomplished in the same manner as in conventional zone melting. Impurities are concentrated in the liquid metal as the zone is passed slowly through the rod.

One type of zone melting apparatus is shown in operation in Fig. 3. Rods of iron and chromium purified by conventional and floating zone melting, respectively, are shown in Fig. 4. The research conducted on metals such as these helps to guide the research programs of others on preliminary alloy evaluation.

Large numbers of alloys which are needed for evaluation programs are made at a rapid rate in a multiple-hearth arc melting furnace shown in Fig. 5.

The furnace consists of a vacuum chamber sur-

Fig. 6—Completing the assembly on the console of a 600-lb consumable electrode arc melting furnace (in the background)

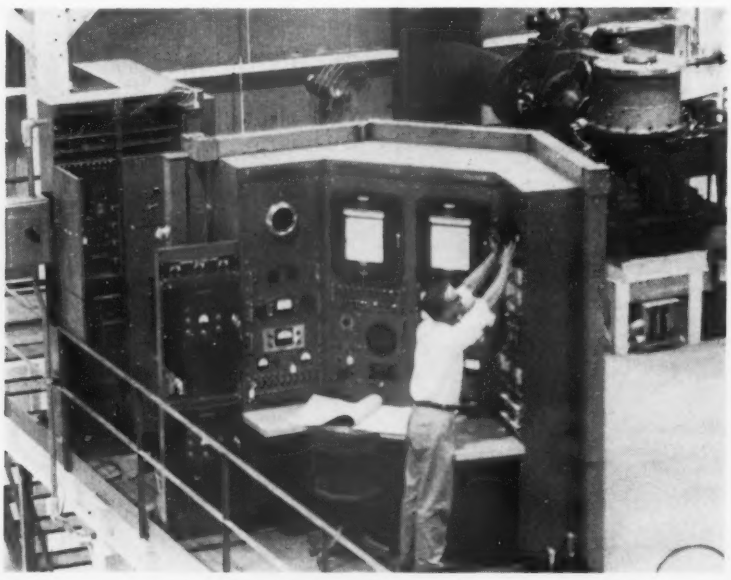
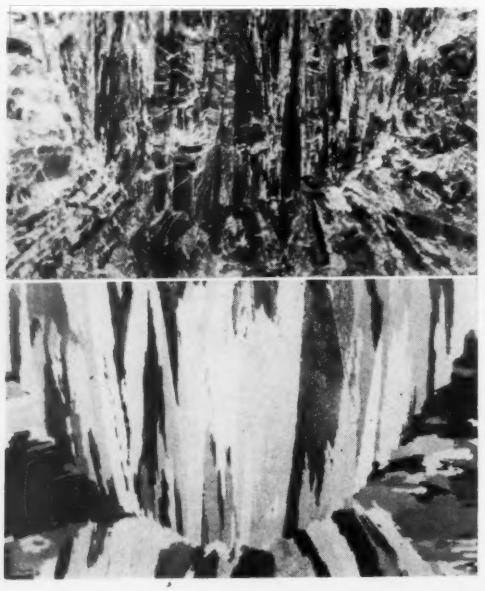


Fig. 7—Alnico fractured grain structure—top, fractured; bottom, polished and etched



rounding a water-cooled rotatable platform upon which the crucibles are mounted. Indexing of the crucibles to the melting cone is accomplished by rotating the platform from outside the furnace. Arc control and pool rotation are achieved through the use of magnetic fields. The arc is initiated from a water-cooled, tungsten-tipped electrode which is centrally located in the water-cooled radiation cone.

Atomic Hydrogen Melting—Another recently developed furnace for melting small quantities of metal without danger of contamination from the crucible is the atomic hydrogen furnace. This furnace utilizes the principle of atomic hydrogen melting for welding developed by General Electric's famed physicist, Dr. Irving Langmuir. Hydrogen gas is fed through an arc developed across a pair of tungsten electrodes. The hydrogen molecules, which are broken up into atoms in the arc, are reformed on the surface of the metal. This process gives up heat to the metal and causes it to melt. Metals which are reduced by hydrogen, and ceramics which are not reduced by hydrogen, can be melted by this method. Tungsten and molybdenum are examples of metals and alumina and zirconia are examples of ceramics which can be successfully melted.

The most promising alloys found in preliminary investigations are then produced in quantity in a 50-lb, vacuum-inert atmosphere arc melting furnace or in a 600-lb, consumable electrode vacuum-inert atmosphere arc melting furnace. Fig. 6 shows the latter partially assembled. This furnace, which has been designed by laboratory scientists, embodies some of the most advanced designs in the metallurgical industry. It possesses the versatility necessary to melt all types of refractory metals and alloys (W, Mo, Ti, Zr, etc.). One of the prime considerations is operator safety. A closed circuit television system allows the operator to view and control the furnace from a position of safety, at the control console. Another feature is the blowout port extending out of the building from the furnace. This would markedly diminish the force of an explosion if it should occur in the furnace.

The quantities of metal produced in the 50-lb and 600-lb arc melting furnaces are sufficient to allow fabrication of actual devices for in-service testing.

Grain Control—A third direction in which research is being carried out from the fundamental standpoint through to the development of useful materials is that of controlling the grain orientation in castings. One example illustrating the usefulness of grain orientation control is afforded by the powerful Alnico directional grain magnets. By controlling the orientation, a magnet of the same size as those previously used can be made half again as powerful. Fig. 7 illustrates the grain structure in an Alnico chill-cast magnet produced by the Carboloy Department of the General Electric Co.

Fundamental investigations dealing with grain orientation are nearly always conducted on single crystals. For this purpose it is necessary to have furnaces which allow unidirectional solidification of the molten metal. A number of such melting furnaces are in nearly constant use in the laboratory. The results of research conducted on materials produced in these furnaces help guide the programs of others who are doing similar pilot-plant work.

Frequently, the results in one area of investigation greatly assist the investigations of others in seemingly unrelated areas. For example, the process of zone melting (which involves unidirectional solidification) can be applied to the task of making single crystals. Nearly all of the melting and casting techniques are interdependent although at first glance it may not appear to be so. On the chart (Fig. 8) are outlined most of the melting techniques in use in this laboratory. Some of the major dependences are shown by tie lines between methods. It can be seen at a glance that the melting and casting techniques in use in research and development work are not an agglomerate of isolated techniques, but rather a single closely integrated network.

General Electric Co. has recognized that the scientific results in the area of materials improvement have not been reaching industries and hence the general public as rapidly as they should. This laboratory should be the initial step to open the bottleneck and make the findings of science available in the shortest possible time.

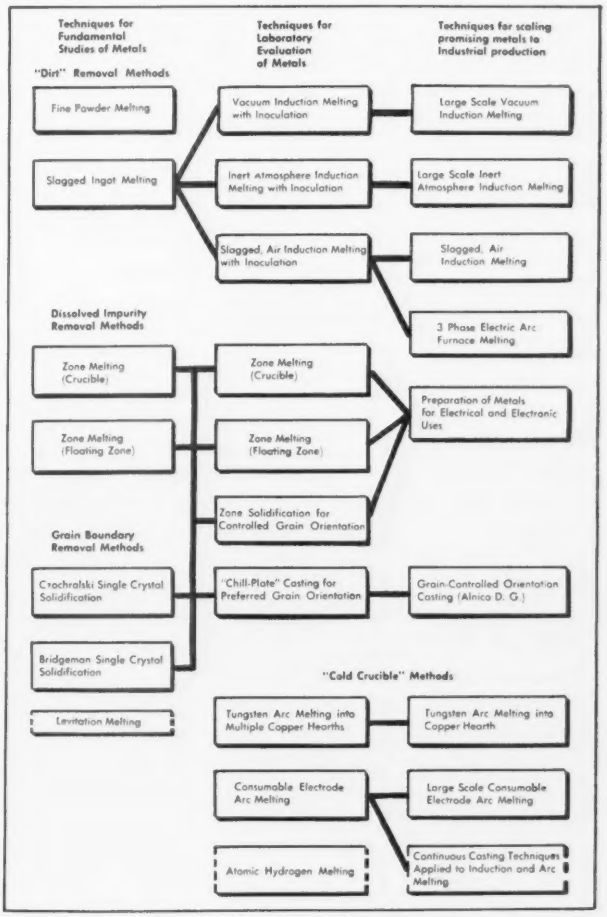

Techniques for Fundamental Studies of Metals
Techniques for Laboratory Evaluation of Metals
Techniques for scaling promising metals to Industrial production
"Dirt" Removal Methods
Fine Powder Melting
Slagged Ingot Melting
Vacuum Induction Melting with Inoculation
Inert Atmosphere Induction Melting with Inoculation
Slagged, Air Induction Melting with Inoculation
Large Scale Vacuum Induction Melting
Large Scale Inert Atmosphere Induction Melting
Slagged, Air Induction Melting
3 Phase Electric Arc Furnace Melting
Dissolved Impurity Removal Methods
Zone Melting (Crucible)
Zone Melting (Floating Zone)
Zone Melting (Crucible)
Zone Melting (Floating Zone)
Preparation of Metals for Electrical and Electronic Uses
Zone Solidification for Controlled Grain Orientation
Grain Boundary Removal Methods
Crochralski Single Crystal Solidification
Bridgeman Single Crystal Solidification
"Chill-Plate" Casting for Preferred Grain Orientation
Grain-Controlled Orientation Casting (Alnico D. G.)
"Cold Crucible" Methods
Levitation Melting
Tungsten Arc Melting into Multiple Copper Hearths
Tungsten Arc Melting into Copper Hearth
Consumable Electrode Arc Melting
Large Scale Consumable Electrode Arc Melting
Atomic Hydrogen Melting
Continuous Casting Techniques Applied to Induction and Arc Melting

Fig. 8—Melting techniques in use in laboratory

View taken on the roof of Electrocast Steel Foundry Co. shows fan house for the furnace fume exhaust system at the left and the collector on the right

There are indirect benefits from a

FURNACE FUME COLLECTOR

By EUGENE F. ANDERSON
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Wheelabrator Corp.
Mishawaka, Ind.

A FUME control system on a steel melting furnace is expected to solve air pollution problems, but a properly engineered system will afford certain less obvious benefits. The experience of Electrocast Steel Foundry Co., Cicero, Ill. is interesting in this respect.

This company had a rather common air pollution problem with its electric furnaces. The plant is located in a fairly congested area. Prevailing winds caused exhausted dust and fume to be dispersed over the roof and plant premises.

Management of the company investigated various fume collection systems. Local exhaust ventilation, employing a hood over the furnace, some kind of dust and fume collector, and duct work between the two, was selected as the most adaptable method.

Electrocast has two electric arc furnaces, one operating regularly, the other serving merely as a standby. The size of collector was selected so that both furnaces could be connected to it at a future date. Only the operating furnace, a 7-ft-diam, 3-ton unit, was connected to it immediately.

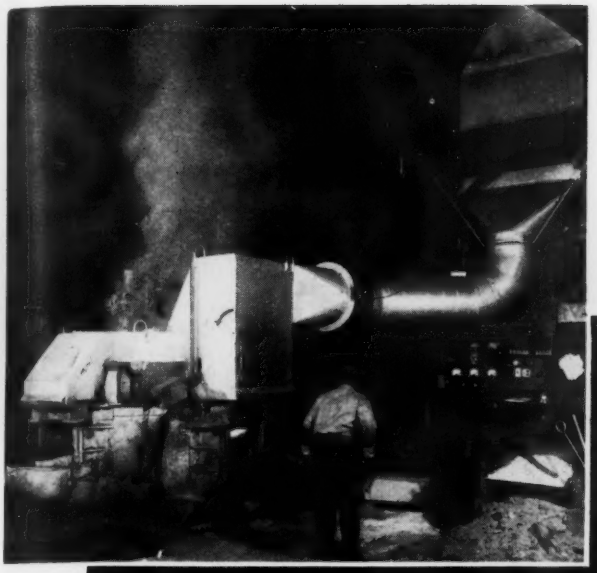
Furnace Roof Hooded—A hood was made to cover the entire roof of the furnace. Air from the room passes through it at high velocity. This counteracts the ambient air currents in the melting room that tend to disperse the dust and fume and traps the particles before they have a chance to escape. The duct work carries the particle-laden air to the collector, which filters it through thousands of square feet of cloth, in the form of tubes. The dust and fume particles are trapped in the tubes, and the air is then so clean that it can be discharged to the atmosphere with no visible matter in it. A "stub" was left in the duct work to facilitate connecting the second furnace to it in the future.

A cloth-filter collector provides filtration efficiencies ranging to 99 per cent and higher, even with the smallest dust and fume particles. Electric furnace fume has a high percentage of its particles (somewhere in the vicinity of 70 per cent) in the 0-5 micron diameter size range. Orlon cloth was recommended for the filter tubes by engineers of Wheelabrator Corp., Mishawaka, Ind., who designed the collector.

It was selected because of the high temperature of the fume-laden gases and the fact that furnace fume has small amounts of corrosive sulphur, nitrogen oxides, and ozone in it. Orlon cloth has an operating limit of 275°F, and withstands the above-mentioned compounds.

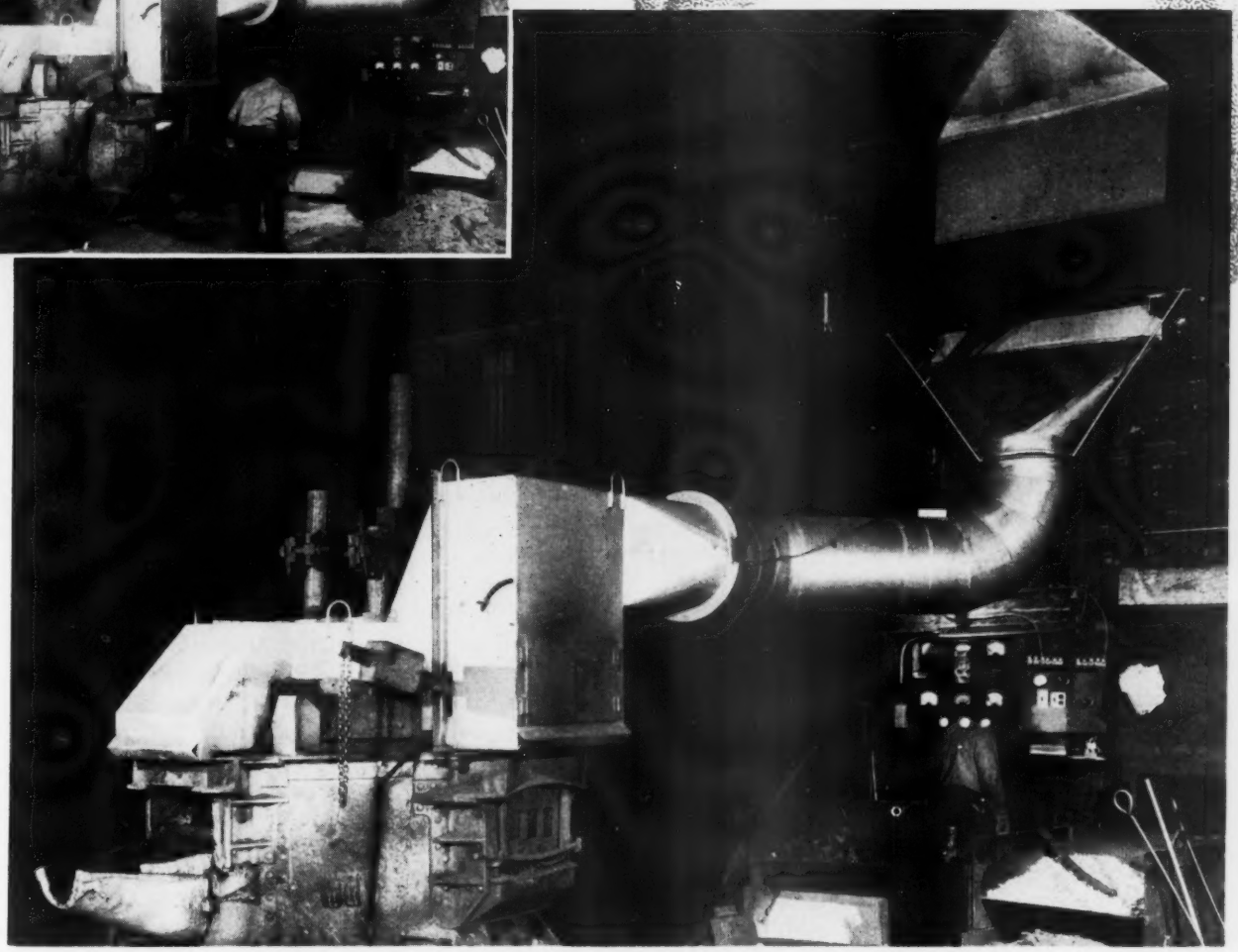
The exhaust system handles approximately 12,000 cfm of air. The hot gas from the furnace passes through 15 ft of duct work to the roof of the foundry, then through 140 ft of duct work to the collector. Radiation cooling in this duct work, in addition to the sufficient amount of cool tempering room air entering the hood at the furnace, keeps the temperature of the gases entering the collector in a usual range of 140° to 160°F. The maximum measured temperature has been 218°F.

Each heat takes 1 hour and 45 minutes, during which time the collection system operates continuously. After the melt, there is a 7-minute period from the start of tapping until the furnace is back



Left—Furnace smoked like this before fume collection system was installed. Collection system hooding and duct work are shown installed, but not in operation

Below—View of the same furnace during melt with the collection system in operation. Fume-laden gases are drawn to collector, and air around furnace is clean



in operation with another charge. During 3 minutes of this 7-minute period, the filter tubes in the collector are mechanically shaken. The dust and fume particles trapped in them drop down into hoppers below, where they remain for disposal. Resistance to air flow across the dust-caked cloth at the end of a heat is around 1.6-in. water gage, as compared with 0.6-in. water gage across the clean cloth.

Production of the foundry averages 38 to 40 heats a week. About 40 lb of dust is trapped from each 6300-lb charge of metal. Over 1500 lb of particles which formerly escaped to the atmosphere each week is now kept under control. Electrocast has a clean stack which meets the rigid regulations of both the Cicero atmospheric pollution board and those of the state of Illinois.

Protects Bus-bar—Other benefits of the exhaust system include much longer life for the copper bus-bars for the furnace electrodes. Electrocast's bars are not water cooled, and flames formerly shooting up oxidized them in two to six month's time. With the fume collector hood protecting them, management is hoping now for a life of three years. The electrode shoes, formerly lasting about one year, will last much longer. The savings of both maintenance labor and the copper itself are important considerations.

Furnace roofs now last longer because they can be kept clean. Much dust formerly settled there, of course, and a dust-covered roof can't dissipate heat as it should. This shortens its life considerably. Whereas furnace roofs lasted from three to five weeks before the fume collection system was installed, they last 20 per cent longer now that they are kept dust-free.

In addition to all this, the pouring floor is cleaner and working conditions are more pleasant.

Selecting Ingot and Scrap in The Brass Foundry

By HARRY ST. JOHN
Foundry Consultant

Refining inferior metal during the melting operation is not a proper part of the foundryman's business. It follows that metal to be melted must be selected and prepared carefully before it goes to the furnaces

REFINING inferior metal during the melting operation is not a proper part of the foundryman's business. It follows that the metal to be melted must be carefully selected and prepared before it goes to the furnaces.

Metal used by the average brass foundry consists of returns—usually about 60 per cent of the total if turnings from machined castings are returned to the foundry—and purchased metal—usually about 40 per cent of the total. The proportion of purchased metal is just enough to equal the weight of good machined castings plus the losses experienced during foundry operations. Incidentally, one of the foundry's important saving potentials, which will be discussed in a future article, lies in increasing the proportion of good machined castings from an average 40 per cent to a possible 50 or 55 per cent.

In present practice, new metal ordinarily means composition ingot purchased from a secondary smelter, with minor quantities of virgin metals and such items as phosphor copper and other additives. Ingot should be purchased on specification, but the really important thing is to buy from a reliable source, one which can be depended upon to supply whatever is needed, promptly and accurately.

Chemistry Sets Specifications—For the most part only chemical specifications are used in the purchase of ingot. Although the foundry may have to meet physical specifications, such as tensile strength, elongation, etc., in the production of its castings, it is commonly assumed that if the chemical composition of the ingot is within specified limits, the physical properties of the resulting castings will be controlled by the foundry processing the metal.

Ingot specifications for a considerable number of alloys have been established by the American Society for Testing Materials and by other trade and technical associations. Three ASTM specifications for commonly used alloys are listed in the accompanying table, in parallel with specifications for castings of the same nominal composition.

Although these ingot specifications are standard, it is wise for the foundry to exercise a certain degree of flexibility in its dealings with ingot manufacturers, keeping in mind the specifications which the castings must meet and the conditions existing in the foundry itself.

It will be seen, for example, that in Alloy 1B and 4A, the ingot specification is intended to compensate for a possible loss of tin and zinc and a possible pickup of lead, nickel, iron and phosphorus. A lead pickup in Alloy 1B is something to be guarded against, but a nickel pickup is highly improbable. In fact, the foundryman may very well wish to raise the nickel to the 1 per cent permitted in the casting and should not object to getting that amount in the ingot. On the other hand, one should be concerned about the possibility of a sulphur pickup, for which the specification does not make adequate allowance.

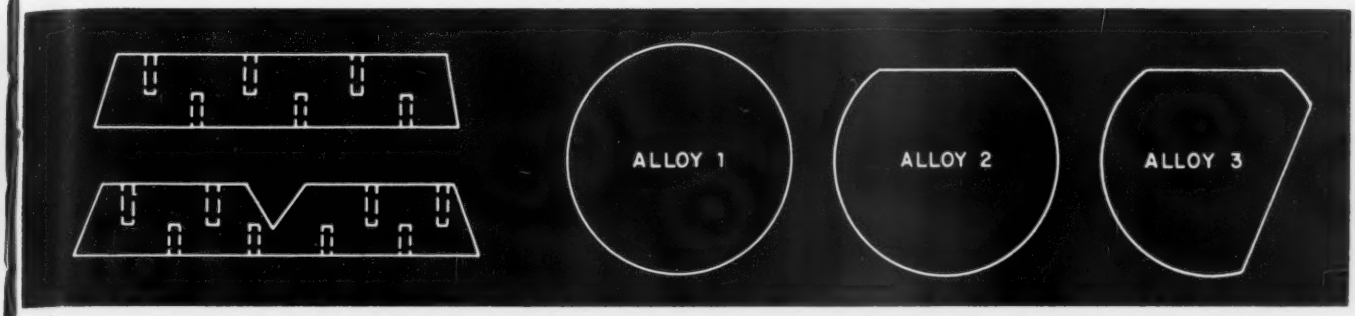
Ingot specifications serve a double purpose. First, they should insure that the castings to be made will meet the specifications required of them. Second, they should be such as to make certain that the ingot has been carefully made. A sloppy product is likely to give trouble in a manner which cannot be foreseen merely by scrutinizing the chemical analysis. It is to be remembered that the smelter's refining operation centers around the oxidizing of undesired elements, and the foundryman should make sure that this has been done thoroughly.

For example, under Alloy No. 4A in the table, the conventional specification allows up to 0.25 per cent iron. It is true that this iron content in the ingot probably will not harm the castings, but it is an indication that the oxidizing operation may have been superficial. For this reason the writer prefers a top limit of 0.15 per cent iron.

Standard specifications permit up to 0.08 per cent sulphur in Alloy No. 4A and 0.05 per cent in Alloy No. 1B. The reason for this distinction is not clear but, whatever the reason may be, the

Fig. 1—For ingot metal analysis, take drillings. Space the holes evenly from one end to other and on top and bottom

Fig. 2—One way to identify alloys is by varying the shape of the sprue heads in the manner shown by examples below



writer feels more comfortable if the sulphur content in his castings is well below 0.05 per cent in any of the red brasses and bronzes. This in spite of the fact that at times sulphur as high as 0.10 or 0.12 per cent seems to do no harm. The fact remains that at other times 0.07 or 0.08 per cent sulphur may be ruinous.

With respect to variation of the principal constituents, Alloy No. 4A is not very critical. In particular the percentage of copper and zinc may vary substantially without much effect on the physical properties of the metal. Most recent specifications permit nickel up to 0.75 per cent to be substituted for a like amount of copper, but there seems to be no reason other than usage to limit nickel to so small a total. Experience has shown that the addition of nickel to this alloy, up to a total of 2 or 3 per cent or even higher, greatly improves the metal without any detrimental effects.

Aluminum and silicon are deadly poisons in the red brasses and bronzes. Specifications which name a limit of 0.005 per cent for these elements are unrealistic from the standpoint of chemical analysis. For both elements the foundry should specify "none" and hesitatingly pass an analysis which lists "trace."

Alloy No. 7A unlike Alloy 4A and 1B, is critical in the proportions of copper and zinc. Minor constituents such as iron, aluminum and manganese are also important, and care must be taken to see that all are in line if the desired physical properties are to be attained.

These are matters which will be discussed in more detail under the headings "Variety of Alloys" and "Influence of Impurities." They are mentioned here because they have a bearing on the policy to be followed in dealing with high specifications.

Analyzing the Metal—The analysis of metal is a function of the chemical laboratory and there will be no attempt here to discuss methods of chemical analysis. However, it is the foundry's job to provide the laboratory with samples truly representative of each lot of ingot. The ingot maker should deliver each heat of ingot separately and from each heat sample ingot should be selected at random, one for each 5000 lb included in the heat, or in any case not less than a total of five from any shipment. Drillings are then taken from each ingot from holes spaced evenly from one end of the ingot to the other, part from the top and part from the bottom of the ingot, depending upon its shape. See Fig. 1.

The holes should be staggered and should penetrate approximately half through the ingot. The complete sample of drillings may be delivered to the laboratory, or a more wieldy sample may be obtained by quartering in accordance with instructions from the laboratory.

The above is an example of an adequate sampling method. Other methods are sometimes used as agreed upon between buyer and seller.

A difference of opinion exists as to the relative merits of "rough-top" and "smooth-top" ingot. Proponents of the smooth-top variety argue that since the rough oxidized crust has been removed from the exposed surface of the ingot, the buyer is paying for nothing but good metal. Also the ingot looks better and its quality can more readily be observed. On the other hand, it is said that copper oxide is often employed in foundry melting and is a rather expensive item. The rough-top ingot carries with it its own copper oxide at less cost. Actually the writer could never discover that there was much to choose between the two varieties. The decision can safely be left to individual preference and no harm done.

There is little to be learned from the outside appearance of an ingot or from its fracture, aside from the characteristic smooth and silvery surface areas which result from aluminum or silicon contamination. Gas holes or dendritic crystals which may mar the ingot fracture are not necessarily an indication that similar defects will be found in the casting.

In cases where the foundry must meet unusually exacting requirements, it is wise to make doubly sure that the ingot to be used is of top quality. This can be done by making sample melts and pouring test bars or test castings under controlled conditions. The test bars should show physical properties 30 per cent or more higher than the usual minimum specifications for the alloy in question.

Foundry Returns—A large proportion of the metal to be melted will consist of foundry returns, including sprues, gates, risers and castings which have been found defective in the cleaning room. Most of this material will carry with it some adhering molding sand and possibly a few cores in the scrap castings. Some authorities have gone on record as saying that the removal of this sand before melting is essential. Actually it is desirable rather than essential. No serious harm will result if sand goes into the furnace along with the metal. Unless the proportion of sand is excessive, its only effect will be to increase the fuel consumption — very slightly — and to increase the amount of slag which will either adhere to the furnace lining or crucible wall, or require skimming from the metal before pouring into molds.

The furnace lining or crucible will deteriorate somewhat more rapidly if the slag is excessive. All of those add up to a small but appreciable expense. On the other hand, it costs something to clean metal before melting. The foundryman will do well to compare these costs as they apply to his own particular case and be governed accordingly. If he can manage to blast his gates and sprues before melting at a sufficiently low cost, he may save a little money and, at any rate, will have a neater, cleaner operation.

If the foundry handles several alloys—and what brass foundry doesn't—it is of the utmost importance to keep the foundry returns from getting mixed. When the difference in value amounts to 5 or 10 cents per pound, degradation of the more costly alloy becomes a serious matter. One precaution is to have an alloy number worked on the pattern where it will show on the runner. Another scheme is to identify the alloy by varying the shape of the sprue head. One such arrangement is illustrated in Fig. 2. No matter what plan is used, nothing will take the place of close, conscientious supervision of metal storage. Anything less will cause trouble.

Scrap castings from the machine shop should

Fig. 3—If a foundry handles several alloys, as most do, it is of the utmost importance to keep foundry returns from getting mixed. Degradation of costly alloys is expensive enough to become a serious matter

Specifications for Three Alloy Ingots and Castings

	No. 1B B 30-54 Ingot	B 143-52 Castings 83-8-04	No. 4A B30-54 Ingot	B 62-52 85-5-5-5 Castings	No. 7A B30-54 Ingot	B 147-52 Mn-Br Sand Castings 7A
Cu	86.0-89.0	86.0-89.0	84.0-86.0	84.0-86.0	56.0-62.0	56.0-62.0
Sn	7.75-9.0	7.5-9.0	4.25-6.00	4.0-6.0	0.5-1.0	1.50 max
Pb	0.25 max	0.30 max	4.0-5.75	4.0-6.0	0.5-1.0	0.5-1.50
Zn	3.5-5.0	3.0-5.0	4.5-6.00	4.0-6.0	remainder	remainder
Ni	0.75 max	1.0 max	0.75 max	1.0 max	0.50 max	.....
Fe	0.10 max	0.15 max	0.25 max	0.30 max	0.75-1.5	2.0 max
Sb	0.25 max	.....	0.25 max	.....	.....	.....
S	0.05 max	.....	0.08 max	.....	.....	.....
Al	none	.....	none	.....	0.25-1.0	1.5 max
Si	0.005 max	.....	0.003 max	.....	.....	.....
P	0.03 max	0.05 max	0.03 max	0.05 max	.....	.....
Mn	.....	.....	.....	.....	0.10-0.50	1.5 max

be examined to detect those which contain parts of broken tools. These should be put aside for special handling. If pieces of iron or steel are allowed to get into the foundry melt the result will be iron spots in the castings, causing excessive tool wear, broken tungsten carbide tips and high blood pressure in machine shop supervision.

Castings carrying appreciable amounts of oil or grease should be cleaned before delivery to the foundry just as carefully as though they were to be delivered to a customer. Contamination of this sort can cause the foundry a great deal of trouble.

Captive foundries invariably are expected to use in their melt machine turnings derived from their castings; the same is commonly true in the case of jobbing foundries. Sometimes screw machine turnings and clippings from rod and sheet brass are also included. The important thing to remember here is that such material must be clean. Orange peel, banana skins and snuff boxes are not wanted in the foundry melt and should properly be removed before turnings reach the foundry. Otherwise a screening operation is advisable.

Keep It Dry—Turnings wet with cutting oil or soap water should not be charged into any melting furnace. In certain furnace types wet turnings will inevitably make the metal unfit for use in castings. At best, oil will interfere with efficient melting of the turnings. The first step in making wet turnings fit for foundry use is to put them through a centrifugal separator. This should reduce the oil content to about 2 per cent. The residual oil should then be removed in some type of dryer. The dried turnings should be passed through a magnetic separator to remove all free iron. Turnings thus processed are excellent material for melting. Under favorable conditions, they are equivalent, pound for pound, to purchased ingot. However, while some furnaces will handle loose turnings, others will not do so efficiently. In the latter case a briquetting operation is advisable. Similarly, clippings should be cabbaged. Otherwise, they are too bulky for convenient use in any furnace.

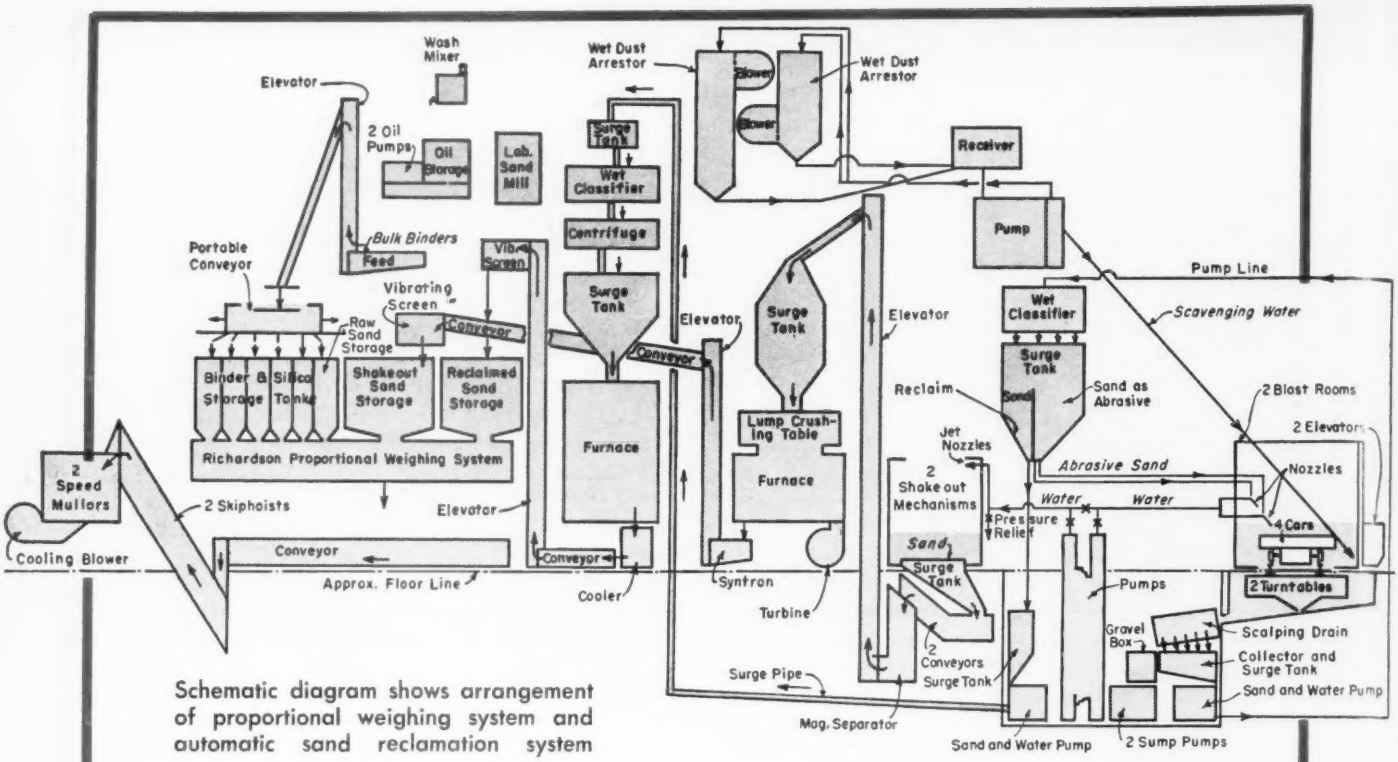
Equipment is available in which turnings can be dried efficiently and then passed over a magnetic pulley so that the two operations are combined at a considerable economy in labor. Hoods and good ventilation must be provided wherever hot turnings of an alloy containing lead are being handled. The danger of lead poisoning seems to be greater in an operation of this kind than at any other point in the foundry.

It is important that oil and cutting compounds be "boiled off" rather than "burned off." In other words, a reducing atmosphere in the dryer is essential. Otherwise each particle of metal becomes covered with a tightly-adhering film of oxide. The oxide not only represents a substantial metal loss but also acts as an insulating coating which makes it very difficult to melt the turnings later on in the foundry furnace. Turnings should appear bright as they leave the dryer. Any piece of paper or sliver of wood which happens to be mixed with the turnings should not be consumed in the dryer but should come out as charcoal.

Dried turnings, and in fact all metal ready for delivery to the furnaces, should be stored in a dry place. If they happen to become wet they should be dried before use.

Even when a reducing atmosphere is used, any method of drying by heat is bound to result in some oxidation. Other methods have been suggested but none is known to be in commercial use. Washing oily turnings with an alkaline solution has to be followed by a rinse and a drying operation. A more promising idea is to clean the turnings with an organic solvent, just as small screw-machine parts are commonly cleaned. If not too expensive, this method would offer some advantage and should be entirely practical.

Spillings from the pouring floor, pieces of metal in waste foundry sand, metal trapped in skimmings and ladle scourings cannot ordinarily be used directly in the foundry melt because they are likely to be of mixed composition. They can be prepared for foundry use by a concentrating operation followed by melting and chemical analysis. The composition is then modified to conform with a desired specification by suitable additions of new metals in the foundry melt. Large foundries may find it profitable to follow this practice but smaller establishments will usually prefer to sell their waste materials to a smelter. Even so it is profitable to concentrate low-grade materials before selling. Equipment manufacturers offer a variety of equipment for this purpose. This and other matters pertaining to salvage will be discussed in a subsequent article.



Schematic diagram shows arrangement of proportional weighing system and automatic sand reclamation system

Production and Quality Raised by

AUTOMATED SAND SYSTEM

One of the real opportunities for upgrading castings today lies in improving sand formulation and control. This article describes an automated sand formulation, processing, handling and distributing system

By I. H. RICHARDSON
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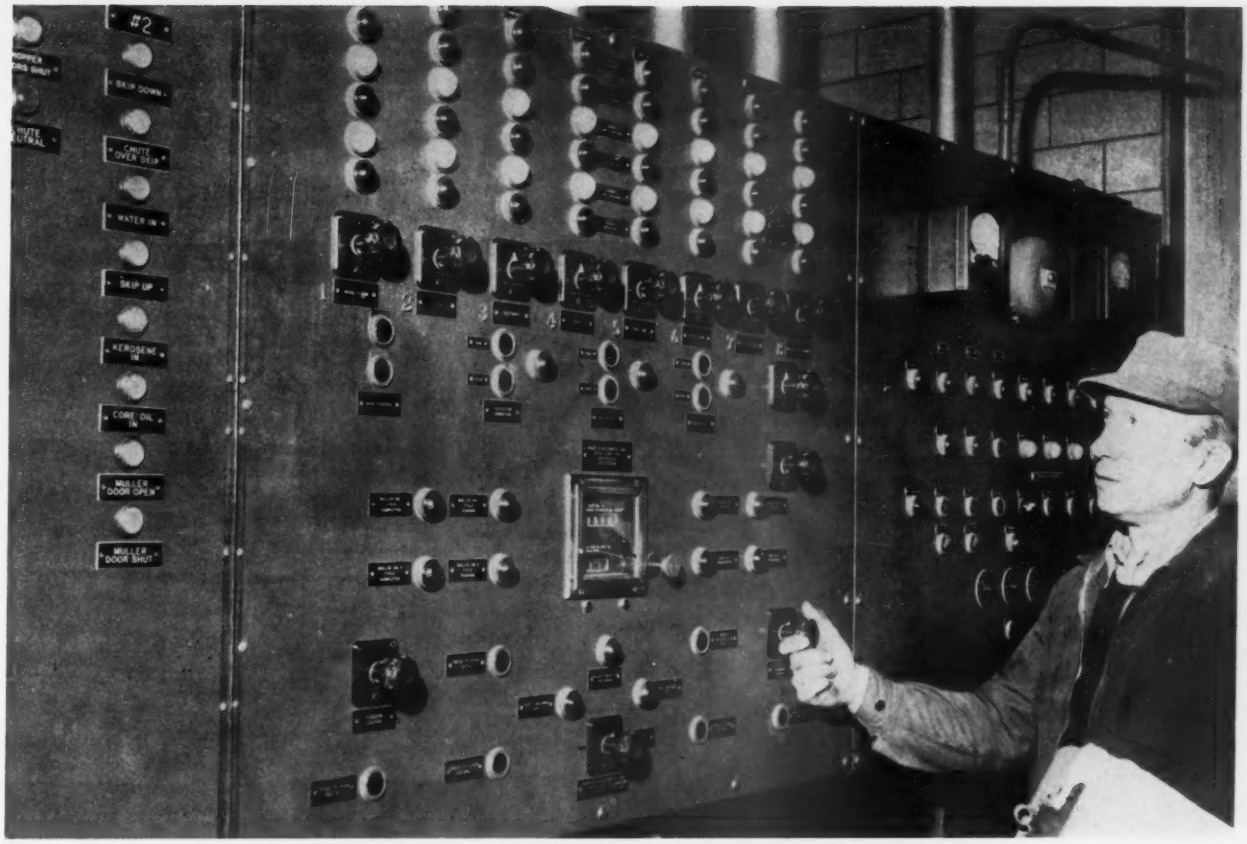


Formulating is regulated from control panel. Lights at left indicate sequence of operations for skip hoist and No. 2 muller. Selector knobs are marked 1 through 8 for different materials. Lights on top of them indicate progress of weighing cycle

TWO distinct attitudes are spurring the trend to automation in the foundry industry today. First, for competitive reasons there is strong feeling that production per man has to be increased substantially. Second, there is a great need to standardize and improve the quality of foundry products.

Although it is not always so credited, automation stands just as much for improved quality as increased production. Mechanization, strictly speaking, will perform the latter function. But automation, by virtually eliminating the need for human intervention, will do much more—particularly when it comes to upgrading a product or process.

One of the real opportunities for upgrading casting today is in improving sand formulations and control. Many foundries are giving this matter serious thought, as recently publicized national symposiums attest. General Electric Co. has set up what is probably today the most automated sand formulation, processing, handling and distributing operation in the country.

Chief accomplishment in this $200,000 proportioning installation at Everett, Mass., has been the placing of sand formulation under rigid control where formerly difficulty in control existed. GE has also been able to boost its production per man on sand preparation by 800 per cent. This is the story of how it was done:

The Old System—At Everett, GE makes steel castings weighing from 5 to 36,000 lb. Under its former system of formulating core sand mixes, three mullers were operating steadily—one on a two-shift basis (19 hr per day) and the other two for one-shift.

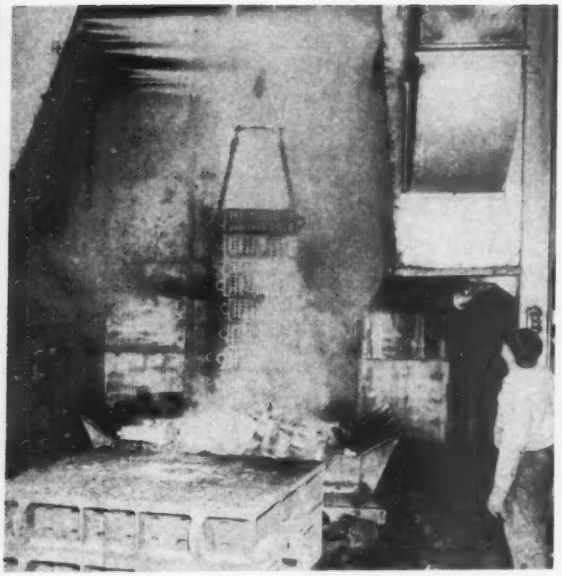
A typical batch averaged less than 1000 lb. Two operators loaded and tended each muller. Skip hoists feeding the mullers were filled manually with required quantities of sand, binders, silica flour and wood flour. These ingredients were added by the bag or shovel; measurements were controlled by personal count and by marks on the skip hoist.

Green sand was made up by feeding ingredients via interlocking conveyors to a central collecting area, the proportions of the mix being controlled by the speed of the conveyors. This sand was stored on the foundry floor.

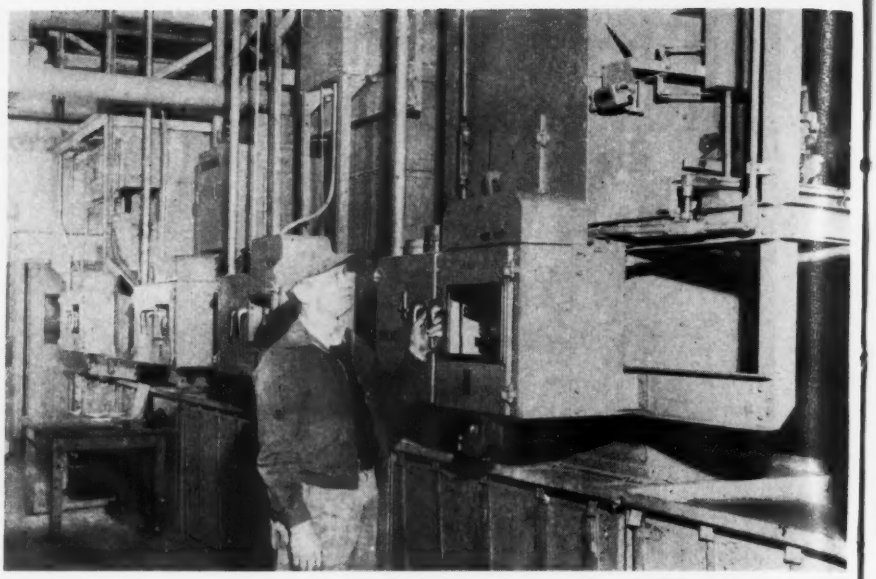
The New Setup—In its new formulating system, ingredients are automatically weighed out, then conveyed to the mullers. Batches are discharged from the mullers and distributed to storage hoppers. The entire handling, processing and distributing system is controlled by one operator at a panel board.

GE makes up a variety of sand mixtures using cereal, bentonite, dry resin, silica flour, washed reclaimed sand, shakeout sand and new sand. In this batch proportioning system, eight automatic scales are at work.

In making up a formula, individual scales discharge make-up ingredients onto a rubber belt con-



In new shakeout system, sand from molds falls through grid into surge hopper and is reclaimed



Checking the silica-flour scale. Others are in background. All the scales are arranged in-line

veyor. The material is collected and fed alternately to two mullers. Measured quantities of water and core oil are automatically injected to the mix in the mullers, according to the demands of the formula.

Practically all used sand is reclaimed. Shakeout now takes place in a three-sided compartment, from the top of which parallel streams of water are ejected. Sand forced out of the flask drops through a grid, and is put through a reclamation process. About 20 per cent of the castings are cleaned by high-pressure water blast, and this sand too is processed and reclaimed. The other 80 per cent of the castings are pressure-blasted by a process that uses a continuous-type abrasive tank.

Advantages of New Over Old—1. Increased Capacity: The two mullers now operating on one shift can do as much work as the three mullers, operating intermittently on two shifts, formerly did. The new mullers have a 2000-lb capacity, about twice that of the old ones. The automatic proportioning system can feed weighed ingredients to these mullers every 60 sec. Right now, GE turns out about 150 prepared sand batches in a typical 8-hr working day. At times, however, output goes as high as 200 batches.

2. Greater Flexibility: Formulas can be changed as often as every five minutes, if needed.

3. Labor Savings: With the aid of conveyors and the new proportioning system, one man does what nine "equivalent" men formerly did. In addition, this operator has time to clean the mullers, reload the binder and sand bins, and run some routine sand tests. There are also considerable savings in the new shakeout and sand reclaiming system.

4. Better Quality Control: Mixtures are checked daily in the plant laboratory. GE has been able to set up quality control over the formulation of molding and core sand mixtures.

5. Material Savings: As a result of the sand reclamation system, the foundry is buying half the amount of sand it formerly did.

6. Less Waste: With the manual formulating system, mixes contained ingredients that frequently varied from required weight by as much as 20 per cent. Often these weights were on the high side, as operators would tend to add a little extra rather than be underweight, particularly when an essential ingredient was in question. When mixes were so far off that a batch had to be rejected, of course, there was an additional waste.

7. Easy Maintenance: Over 200,000 batches of mixed sand have been made up since operations began. The only repairs to the batch proportioning system have been minor electrical ones. Maintenance is of a routine variety, and is performed by the scale-room operator and the plant maintenance department. Except for that, a service man checks the scales every six months for performance and accuracy.

How Mixes Are Prepared and Distributed—1. Selecting Ingredients: Operator first goes to the panel control board, selects the ingredients going into the mix, and gets the system ready for operation. He next goes to the scales that are situated in-line above the collecting conveyor. Each of the eight scales is numbered, and the ingredient being handled is noted on each unit.

The operator adjusts each automatic scale to deliver the prescribed weight by moving the poise on the scale's weigh beam. He also selects his additions of liquid ingredients by setting appropriate meters.

2. Weighing Them Out: After weights have been selected, the operator chooses the number of batches to be made up by setting a counter on the control board. On signal from the control board, feeding to the scales commences.

Scales discharge their materials simultaneously to the collecting conveyor. Progress of the weighing cycle is indicated by colored lights on the control board. Appropriately, the feeding, weighing,

and discharging cycle is repeated automatically until the required number of batches has been prepared. If required, the operation may be controlled step by step from the control board.

3. Conveying to Mullers: Material discharging from the scales is sent by the collecting conveyor via a swivel spout to one of two skip hoists.

4. Mixing: Batches of core and molding sand are mixed in 2000-lb mullers. The two mullers in service are employed alternately. Mixed batches are discharged into a surge tank. During a mixing cycle, water or core oil is injected into the mullers automatically. If liquid feeding should fail, an alarm sounds at the control board.

5. Conveying to Storage: After mixing, sand is distributed to storage. The operation is controlled from a separate panel located in the scale room alongside the main control panel. This panel controls the operation of the belt-distribution system and the plows located above the various belts. Controls consist of operational indicator lights and a 16-position plow set.

Different materials have to be handled in different ways. In fact, accurate weighing is as much a materials handling problem as it is anything else. Ingredients for the mixes are fed to the automatic scales and weighed according to their handling characteristics and the relative quantities demanded by the process.

Thus, wood flour which is a highly pulverized, lightweight material, is screw-fed from storage hopper to a scale. It drops onto a belt feeder that is an integral part of the scale. From this scale the wood flour is discharged onto the collector conveyor in quantities weighing from 20 to 80 lb. A vibrator mounted on the weigh hopper is sequenced with the operation of the scale.

Silica flour, also a highly pulverized material, is required in amounts weighing from 75 to 500 lb. It is handled by a scale, and is fed from alternate storage bins by screw feeder.

Cereal and bentonite are fine-grained bulky materials that are needed in 10 to 60-lb lots. These materials are fed from storage to scale by a screw feeder.

The three sands—new, reclaimed and shakeout—are coarse-grained bulky materials that are relatively easy to handle. However, they are used in large amounts. Reclaimed and shakeout sand, for instance, are required in quantities from 500 to 2000 lb. The problem of handling them was worked out by dropping each material directly from storage hopper to belt-fed automatic heavyweight scales.

Features of all scales include dust-tight housing, accuracy of ½ of 1 per cent of all material weighed, and electrical wiring in accordance with NEMA standards.

How Mistakes Are Prevented—Scales cannot begin a weighing unless there is ample material ahead for all to complete the cycle.

Scales cannot be discharged unless all weighings are in tolerance, the collector conveyor is running, the swivel spout to the selected skip hoist has automatically positioned itself, and the selected skip hoist is in place.

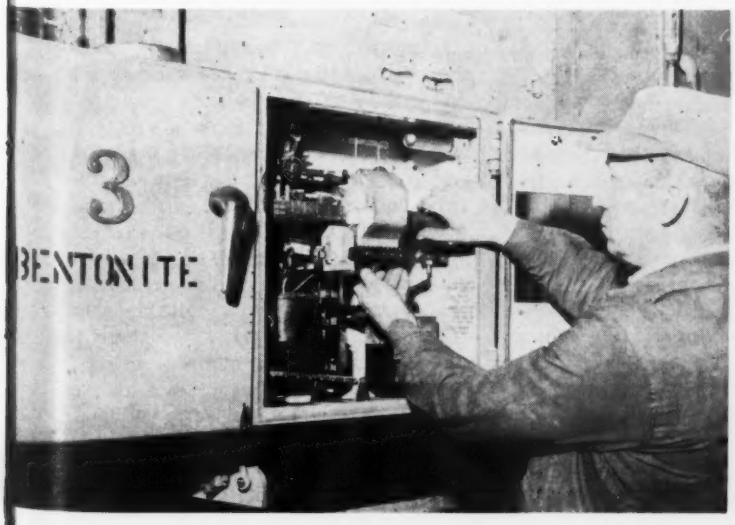
The skip hoist cannot be raised to its muller unless all scales register an "empty balance," indicating complete discharge; also unless all materials have been received by the skip hoist, and water has been injected to the muller.

The muller batch will be rejected automatically unless the core oil has been added at the correct time and in the proper amount.

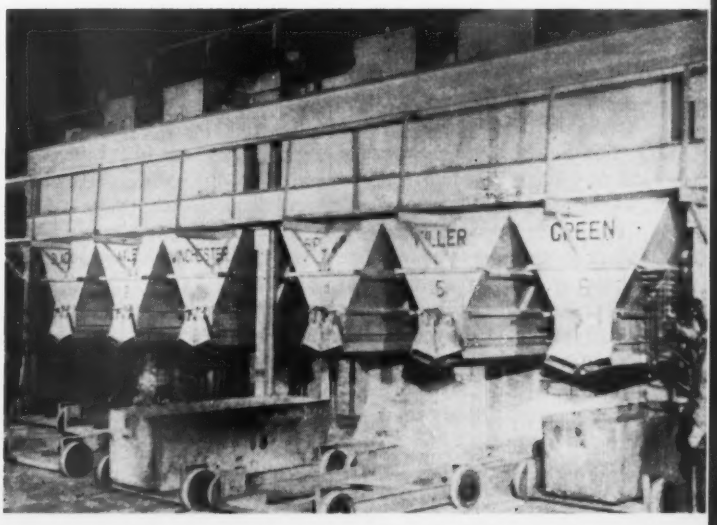
The finished batch can be passed to process only if every mechanical and electrical function has been exactly as specified; otherwise it will be automatically plowed off the final conveyor and sent to the reject bin.

This batch proportioning system was designed and built for GE by Richardson Scale Co., Clifton, N. J.

Operator adjusting scale sets sliding poise on bentonite scale weigh beam to deliver required weight. Weigh-beam box houses other equipment



These hoppers are located on the molding floor and are filled from an overhead belt conveyor. Plows controlled from scale room direct sand



Questions and Answers

Study of available data on cupola melting operations indicates the variations in carbon and silicon content . . . Porosity in iron castings appears sporadically through the heat . . . Sand for brass molding . . . Discoloration on bronze . . . Trouble is encountered with inserts . . . Using steel scrap

Composition of Iron Varies

QUESTION With regard to an investigation of cast iron composition we now are conducting, our work has led us to some of the variations which are encountered in the day to day operation of the cupola. In that connection we wonder whether you can supply us with any information on what could be expected as normal variation of total carbon, silicon, manganese, phosphorus and sulphur in a day's operation of the cupola assuming that charging was being done in a manner to maintain a relatively constant composition.

ANSWER While it is well known that there are variations in the various elements in cupola melted gray irons during the day's operation, little is available in the literature on what those are or might be. *Transactions* of the American Foundrymen's Society, 1949, page 178, gives analysis taken every half hour on two heats from cupolas supplying metal to air furnaces for production of malleable iron. In the first the TC ranges from 2.44 to 2.93 per cent, the Si from 0.84 to 2.43 per cent, and the Mn from 0.40 to 0.65. In the other TC ranges from 2.48 to 2.79 per cent, the Si from 1.26 to 2.02 per cent, and the Mn from 0.48 to 0.65 per cent.

Examination of the first heat, which has a variation of 0.49 per cent TC, shows that over 84 per cent of the analyses were in the range 2.60 to 2.78 per cent TC. Also a consideration of the Si range indicates a variation of 1.59 per cent from high to low, but 45.6 per cent of the analyses were in the range 1.10 to 1.50 per cent Si, and 54 per cent in the range 1.20 to 1.60 per cent Si.

Privilege of examining some data gathered from a number of well operated foundries using excellent control with TC ranging from 3 to 3.78 per cent indicates TC variations from 0.20 to 0.36 per cent. Of those, one foundry had over 95 per cent of the analyses in the range 3.20 to 3.40 per cent, and another 88.7 per cent in the range 3.50 to 3.70 per cent TC. Silicon in the irons ranged from 1.52 to 2.46 per cent, and the variation from 0.20 to 0.65 per cent. Study of the data from one of the foundries showed 80 per cent of the Si analyses in the range 1.82 to 2.10 per cent while another showed 80 per cent in the range 1.60 to 1.80 per cent Si.

While we do not have definite information it appears that the phosphorus variations in those charging around 0.35 per cent, will be plus or minus 0.05 per cent. Sulphur may run from 0.10 to 0.14 per cent in medium strength irons and 0.08 to 0.12 per cent, and manganese may vary from 0.55 to 0.75 per cent depending on whether or not high manganese-bearing material is being charged.

It should be pointed out that undoubtedly the types of raw materials charged will have a bearing on the variations encountered in melting. Hence, the variations occurring in one foundry will not necessarily be applicable to another. It also seems that the forehearth does not provide uniform analyses although it undoubtedly does eliminate any wide swings.

Has Trouble With Gassy Metal

QUESTION Lately we have been having considerable trouble with porosity in our gray iron castings which seems to come and go throughout the heat. Pouring temperature is 2700 to 2800° F and the cupola seems to be operating all right. Our charges, 80 per cent scrap, are motor blocks with the crankshafts removed and No. 1 machinery scrap. We are sending you specimen pieces to indicate the trouble.

ANSWER Samples show numerous small holes just under the surface, and due to their bright shiny interiors are believed to be the result of gas pick up by the iron. Gassy iron may be caused by moist or damp ladles or cupola spouts, nonferrous metals in the charge, or faulty cupola operation. Damp ladle linings will cause the trouble, but after the second or third filling they are dried out and the difficulty eliminated. Since you state the trouble comes and goes, that may not be the cause unless new ladles are being introduced from time to time. Presence of nonferrous metals might be a possibility but not too likely since you mention the crankshafts are removed from the blocks and probably the pistons also. Amount of bearing metal, mainly a copper-lead alloy, probably is too small to cause any trouble.

We suspect that the trouble lies in the cupola. Probably the cylinder blocks from time to time are thrown in carelessly so that an extremely open charge results, and the bed burns away sufficiently to permit some oxidation to occur. On following charges the bed would build up properly, and the troublemaking condition would be eliminated.

Wants Sand for Brass Molding

QUESTION In our foundry in the Northwest we are having trouble with suitable sand for production of brass machinery castings. Naturally bonded sands from this area as well as those from the East seem to lack strength and permeability, tend to burn on, etc. We would like to use silica sand such as employed in cores or shell molding and air ram it like in steel molding. How could we keep up the strength in the heap? What kind of a wash should we use for skin dried molds?

ANSWER If the sands you have been using give the trouble you indicate, it looks as though proper attention has not been given to see that the sand is kept in the proper condition. Possibly the sands have been in use so long that they are loaded with fines, and it might be worthwhile to give them the heave ho, and start with new sand. Again you might try on a small scale, that is using batches of a few hundred pounds, some experiments to see whether the addition of bonding clay or southern bentonite would put the sand back in working order.

As you undoubtedly know, sands suitable in one foundry will not necessarily be satisfactory in another due to variations in foundry practice. Fine sands will give smooth surfaces, but they lack permeability. Hence, one has to compromise between the two characteristics and use a sand which will provide a good surface, and not cause blows. Therefore, you will have to do some experimenting to determine the most suitable sand for your line of work since there is no royal road to that end.

Consequently, it is possible as you indicate to make a synthetic or blended sand to meet your requirements, but it cannot be done in a day. One foundry for example, is using a gen-

eral purpose sand without facing for producing nonferrous castings up to 500 lb in weight. The sand has an average AFS fineness of 160 to 170. Base silica sand is a 5-screen type with 50 per cent on the No. 140 and 200 mesh screens. While details of the bonding material are not available, it appears that it is a mixture of southern and western bentonites, and possibly some clay. As you probably are aware, bonding power of the western and southern bentonites is much greater than for clay, and considerably less is used in formulating the sand mix. Since less bond is employed, the water content is considerably lower than with clay bonded sand.

Your reference to a wash or coating for skin dried molds indicates those for large castings, and a common practice is to use graphite or other carbonaceous material usually with a small amount of clay or other adhesive to hold it in place. Some times the mold faces are just sprayed with lignin (sulphite pitch) or molasses water. A wide variety of suitable coatings are on the market, and we suggest that you use one of those rather than to try to make up your own.

Bronze Surface Is Discolored

QUESTION Please advise us if it is possible to obtain a surface free of oxide in bronze castings. Phosphor bronze proves a little too hard for our purposes. Any information on this problem will be appreciated.

ANSWER So far as we know an oxide coating of some type is present on all metals and alloys, but you probably refer to surfaces which instead of showing a uniform reddish color contain dark discolored areas. These discolorations can be removed by acid dipping or pickling or by abrasive blasting with sand or copper shot. Latter procedure is preferable since no metal is removed in the process and a bright smooth surface is obtained. Sand usually leaves a matte finish.

A variety of acid dipping solutions are used, but we believe you will obtain satisfactory results by using a solution composed of 12 oz of sulphuric acid and 4 oz of sodium dichromate in a gallon of water. Lead-lined or ceramic tanks or containers should be used for the acid. Always pour the acid slowly into the water, not the opposite. Since the solution will cause burns, see that the operators use rubber gloves, aprons and goggles as a safety measure. After dipping, castings are rinsed first in cold, running water, then in hot water containing from ⅛ to 1 oz of soap per gallon. Hot water aids drying, and the soap film prevents tarnishing.

It is difficult to suggest an alloy for the work you are doing since you do not mention its application. One alloy widely used for valves and fittings and numerous other castings is that containing 85 per cent copper, and 5 per cent each of tin, lead and zinc. It is easy to handle in the foundry and might serve your purpose. Possibly the 88 per cent Cu, 6½ per cent Sn, 1½ per cent Pb, and 4 per cent Zn alloy commonly referred to as Navy M or the Navy G, containing 88 per cent Cu, 8 per cent Sn and 4 per cent Zn, might be used.

Blows Caused by Steel Insert

QUESTION We are making some vise screws which consist of a cast gray iron head 3 in. in diam and about 4 in. long in which we cast-in steel rods about ⅞-in. in diam. The head part is turned and polished. Difficulty we have is that the steel rod causes blows resulting in small holes near the surface. While these do not weaken the casting, it does prevent proper finishing. We have tried dipping the ends of the steel rods in various solutions but nothing has proved satisfactory. Can you offer any suggestions?

ANSWER Primary cause of blowing from metal inserts placed in casting cavities to be surrounded with molten metal is lack of cleanliness. By that is meant freedom from oxide, scale, rust, dirt, grease, oil, etc., since they usually create gases when the molten metal comes in contact with them. Therefore, it is advisable to abrasive blast that portion of the insert which will be covered with molten metal so that the area is clean.

Secondary cause is condensation of moisture on the insert which occurs when the insert is colder than the sand. Therefore to eliminate that possibility it may be worthwhile to warm the clean inserts at least up to the temperature of the molding sand before placing in the mold. A good plan is to place them in an oven after abrasive blasting, and leave them there until they are to be used. Also the inserts should not be allowed to lie in closed molds for lengthy periods before pouring. If there is considerable lapse between placing and pouring, it is better to leave the molds open—closing just before pouring.

We assume that the holes you mention are in the vicinity of the rod, but, if they are elsewhere also, the trouble may arise from the mold being rammed too hard or from the sand being on the wet side. Either of those may not be sufficient to cause extensive blowing, but could result in a slight boiling action or agitation.

Use a Small Amount of Steel

QUESTION We are in possession of a large quantity of steel scrap in the form of pliers, screwdrivers, etc., which we would like to melt down to destroy their identity. We have a cupola lined to 21 in., and would like to know if the temperature attained would permit melting and casting the resulting metal into pigs. However, we also manufacture a line of gray iron decorative castings in which cast steel would not be objectional in the end product. Could that be accomplished, and considering the carbon pick up, what would be the identity of the steel after melting with coke?

ANSWER Steel scrap melted in the cupola loses its identity as steel due to the large pick up of carbon, and becomes cast iron. However, unless silicon-bearing material such as pig iron, ferrosilicon, gray iron scrap, etc., is melted with the steel scrap, the iron over the spout will have a white fracture. Steel scrap is used commonly in many foundries as a part of the cupola charge, and you should have no difficulty in doing the same.

You also could as you mention, melt down all steel charges and pour into pigs. In doing that it would be necessary to increase the bed height of the cupola by several inches as well as increase the coke splits between charges by a few pounds to provide carbon for pick up. Also we believe it would be advisable to use some gray iron scrap as part of the charge due to the small size of the steel scrap. Again such pig would show a white fracture unless ferrosilicon or silvery pig iron in sufficient quantity was added to give a gray fracture. However, such white fracture pig could be remelted with the silicon additions made at that time.

We believe you can use the scrap in your present charges in small amounts of 5 to 10 per cent without trouble. We assume your mention of gray iron decorative castings means what usually is termed a "soft" iron and while the steel additions suggested will tend to produce iron that is a little harder, it should not result in any white or chilled sections unless they are thin. If that does occur

then silicon additions will have to be made.

Why not try a charge containing steel scrap as the last of the heat, and pour it into the castings? Fracture a few of those, especially where the thinnest sections occur. That will indicate what you can expect, and you can make adjustments accordingly. Of course, with suitable silicon additions you can increase the steel scrap accordingly.

Thin Sections Are Too Hard

QUESTION We are having trouble with some thin sections we are making in gray iron becoming so hard that we cannot drill them. Our mixture is designed to take care of our general run of castings, but some times we have a few thin ones. Can you suggest a material which can be added in the ladle which will facilitate production of the occasional thin castings?

ANSWER Difficulty with thin sections being too hard to drill can be overcome by addition of suitable amounts of powdered ferrosilicon or other graphitizing agents. A number of these products are available on the market, and names and addresses of producers may be found in the advertising pages. Amount of the agent to be added will depend largely upon the silicon content of the iron over the spout. If, for example, it contains 2 per cent, and the thin section is about ⅛ in., the iron should run about 2.50 per cent silicon. Hence, the difference of 0.50 per cent will have to be made up in the ladle. Amount of ferrosilicon required will depend on its composition. If it is the 80 per cent variety, then about 10 oz should be added per 100 lb of iron. Proper amounts of other graphitizing agents can be determined by following the manufacturers' recommendations.

Small Furnace Does Not Work

QUESTION We tried to make a small open-fire furnace, using propane gas as fuel, for melting small amounts of copper, but out of 10 lb of copper we obtained only 2 lb metal and 8 lb slag. Can you tell us how to get more heat from the fuel and what mixture of propane gas and air would be needed to melt 50 lb of copper per hour?

ANSWER Without any definite information on the type of furnace, we assume that the flame impinges on or passes just above the metal being melted. Although such furnaces are used commercially, we do not believe they are practical on a small scale, and we suspect the difficulty lies in the burner and combustion tunnel design, which permits generation of most of the heat outside the furnace.

Propane is a high Btu content fuel containing around 2500 Btu per cu ft. On the basis of figures available for natural gas, it would require about 52 cu ft of propane to melt 50 lb of copper. Propane needs a large volume of air for complete combustion or about 23.4 volumes per volume of gas. In practice an excess of 15 per cent of air is required so that about 1400 cu ft of air would be needed for the 52 cu ft of gas.

In our opinion you would be ahead by buying a crucible furnace. Of course, you could construct your own, but for reasonable melting efficiency, you would have to experiment with burner and combustion tunnel so that most of the heat generated would be delivered around the lower portion of the crucible, not some place else. If the tunnel is too long, the heat tends to stay in the tunnel; and if it is too short, the heat goes out the top of the furnace.

Cement-bonded Permanent Mold

QUESTION Can you give us any information on making permanent cement molds for use in the production of bronze castings such as water faucets?

ANSWER Although from time to time reference has been made in the literature to the use of cement-bonded sand in making permanent or semipermanent molds, we do not believe that it is practiced to any extent. Cement-sand molds are being used commercially for production of large castings, but they are used only once. In that practice, clay-free silica sand is mixed with 13 per cent cement by weight and 7 per cent moisture. The cement is a high alumina type known as "high early strength." After sand has been rammed around the pattern, it is allowed to air set or harden for several hours, and then the mold is removed from the pattern. Temporary flasks are used since it is hard to remove the finally hardened cement from them. They usually are taken off when the mold is removed from the pattern. Mold is allowed to set for 72 hours and then is ready for pouring.

It seems to us that if you are interested in making ceramic molds, it would be wiser to try ethyl silicate as the bond instead of cement. Fine silica sand or some other refractory could be used as the base. The silicate is hydrolized to provide a workable aqueous solution; directions for that process can be secured from the manufacturers. Sand mixed with the silicate is placed on the pattern in a suitable flask and vibrated into place to secure close contact. It is allowed to air set or harden for about 1½ hours and the flask is rolled over. Then the other half mold is made by the same procedure. When hardened, the cope mold is removed and the pattern taken from the drag mold. Both molds are placed in an oven or furnace and the temperature gradually increased to around 1300° F. Mold is allowed to cool and then used like a metal mold. Since the hydrolyzed silicate solution contains alcohol, the oven or furnace should be ventilated suitably, at least in the early stages of baking. Previous to baking, the mold could be ignited with a torch in the open, and much of the alcohol burned off.

Prior to casting, the molds should be heated, just like metal molds, and it also is advisable to protect the mold faces with a wash containing graphite, placed while the mold is hot. Operating temperature may be in the range of 600 to 800° F and is determined by experiment. Molds should be hot enough to eliminate cold shuts, but not so hot as to result in the casting's cooling too slowly. Temperature indicating paints or crayons might be used as a means of determining whether the mold is within the desired operating range.

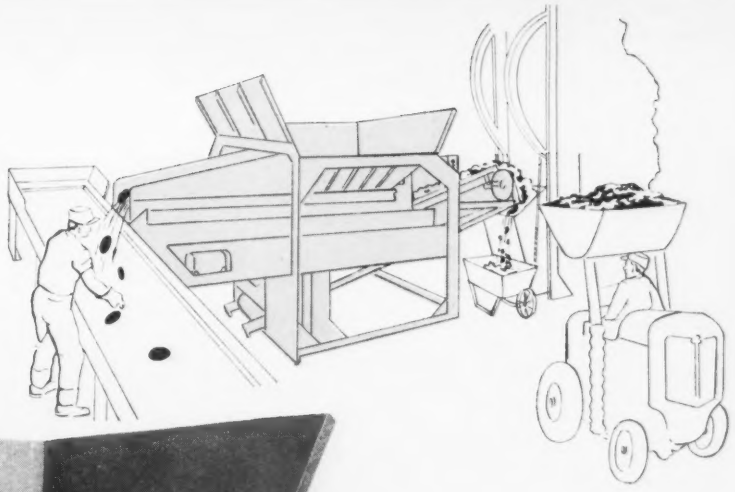
Information on Washburn Core

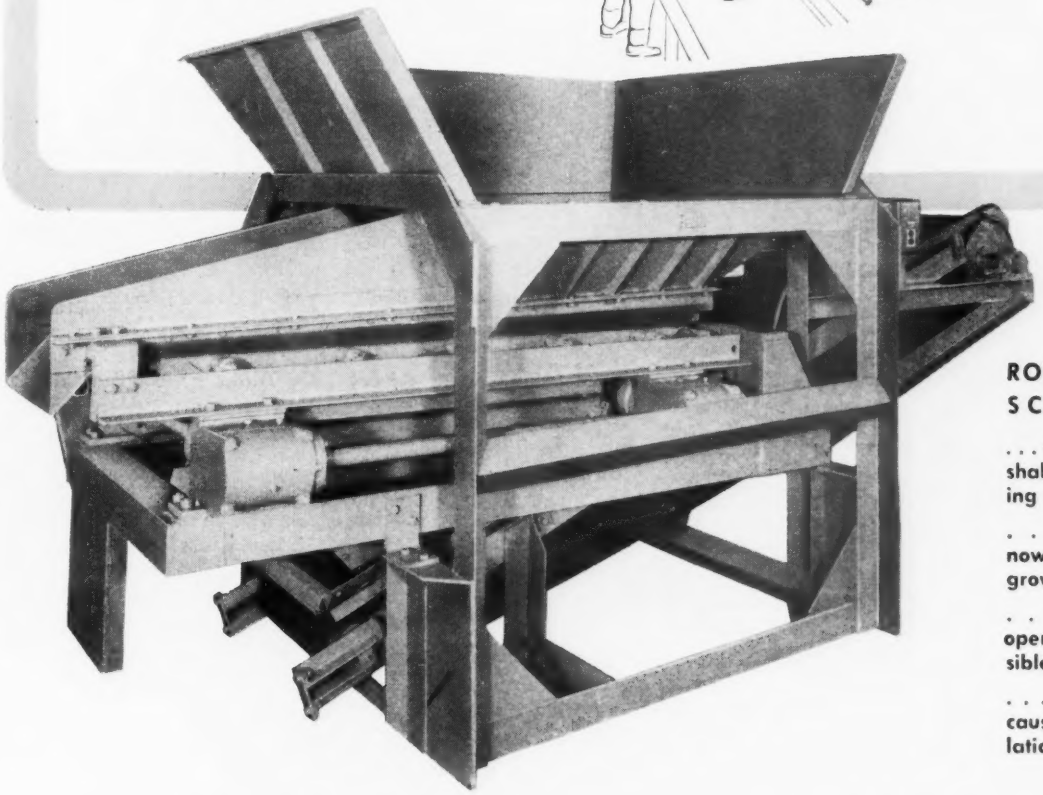
QUESTION Can you tell us briefly what a Neck-down core is and whether it can be used successfully on bronze and aluminum alloy castings?

ANSWER The neck-down or Washburn core is one of thin section which is placed between the top of the casting and the riser. Diameter is equal to or slightly larger than the riser and contains a small central hole approximately 20 to 25 per cent of the cross-sectional area of the riser. While used on gray iron and steel castings, it is said not to be as successful with brass and bronze. That is believed to be because not enough heat is developed in the core to form the necessary hot spot to keep the metal liquid for the desired length of time.

For knock-off type risers on aluminum and magnesium base alloys, perforated screens generally are used. Screens are tinned sheet steel about 0.0125 to 0.015 in. thick with 100 to 144 openings per square inch. For bronzes, plain perforated steel sheets heated to about 1000° F and cooled can be used. The oxide coating resulting from heating prevents wetting and sticking of bronze to the screen. Where risers are over 3 to 3½ in. in diam, thin graphite disks similar to the cores can be used.

One Simple **MECHANIZED** Operation





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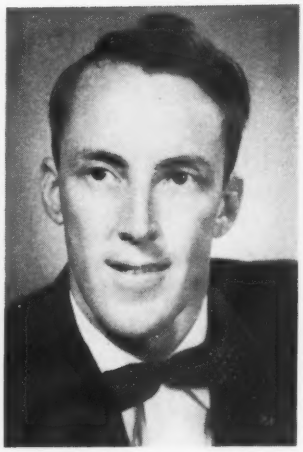
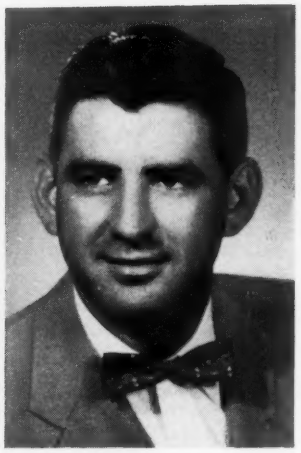
CARL E. ROWE
. . . mfg. v. p., Pressco Casting

EDWARD H. SCHUBERT
. . . joins Westover Engineers



J. A. DEAN
. . . mfg. mgr., Nelson Electric



E. F. HINES
. . . Nelson foundry mgr.

CARL E. ROWE, for the past year production manager, Pressco Casting & Mfg. Corp., Chesterton, Ind., was appointed vice president-manufacturing. **William J. Brinkman,** who joined the company in 1953, was appointed vice president-engineering. Previously Mr. Rowe was with Carl E. Rowe & Co., Milwaukee, consulting engineers; Advance Tool & Die Casting Co., Milwaukee; Lester B. Knight & Associates, Chicago; and Muskegon Piston Ring Co., Muskegon, Mich. Mr. Brinkman attended University of Cincinnati and for many years was associated with Aluminum Industries Inc., Cincinnati.

David Swan was appointed director of research, Metals Research Laboratories, Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., Niagara Falls, N. Y. A graduate of Rensselaer Polytechnic Institute, he joined the Electromet laboratories in 1946 and the following year was named research engineer in the New York offices of the company. Since 1952 he was in Niagara Falls as assistant director of research for the laboratories.

J. Colin Smith was appointed manager of the New York district sales office, Aluminum Co. of America. **Harold A. Faisst,** formerly manager of the Richmond, Va., branch office, was made district manager in Seattle.

Arthur J. Zwanzig was appointed assistant to the vice president-general manager, Alloy Precision Castings Co., Cleveland, where he will direct production activities. A graduate of New York University, he was formerly associated with American Electro Metal Corp., Yonkers, N. Y., as chief engineer.

Edward H. Schubert, for the past two years vice president-special engineering, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., recently joined the foundry equipment division, Westover Engineers, Milwaukee. A graduate of University of Cincinnati, Mr. Schubert joined Weir Frog Co., in 1921. He remained with the company and its successors until this year, as engineer, superintendent and plant manager in Cincinnati, Birmingham and Easton, Pa., prior to becoming vice president.

Leon Decker has been named assistant works manager, Foundries and Pattern Division, Allis-Chalmers Mfg. Co., Milwaukee, succeeding **Anthony Lebesch,** who recently became division works manager. Mr. Decker joined the company 27 years ago and became pattern shop foreman, superintendent of planning and time study, and until recently was assistant works manager. He is a former treasurer of the Wisconsin Chapter of the AFS.

John C. Miller, formerly executive vice president, was elected president, Berlin Chapman Co., Berlin, Wis., succeeding **W. Mead Stillman** who became president in 1944. Other officers include **John B. Gillett,** vice president-sales; **Harold Warner,** vice president in charge of the foundry; **Albert J. Blum,** vice president; **George Devere,** controller-treasurer; and **Walter J. Patri,** secretary.

J. A. Dean was appointed manufacturing manager, Nelson Electric Mfg. Co., Tulsa, Okla. A graduate of University of Kansas, he joined the company 15 years ago. **E. F. Hines,** formerly sales manager of the company's Nemco Foundry in Tulsa, has been appointed foundry manager, a position Mr. Dean held for the past 8 years. Mr. Hines studied metallurgy at Oklahoma Agricultural and Mechanical College and joined Nemco 8 years ago. He was recently elected treasurer of the Tri-State Chapter of the AFS.

George Koehn was appointed manager, Cleveland Foundry Co., Cleveland, succeeding the late Homer Britton, who also was vice president. **Thomas Britton** was named assistant foundry manager. Mr. Koehn spent 22 years with Central Foundry Division, General Motors Corp., and recently was associated with Yates Machine Works, Rochester, Mich. Mr. Britton, son of the former vice president, joined the company 7 years ago.

Donald N. Watkins recently resigned as vice president, Continental Foundry & Machine Co., Pittsburgh, and will devote full time to his position as chairman of Steel Publications Inc., there.

Donald E. Wyman, formerly service engineer, was appointed sales manager of Exomet Inc., Conneaut,

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EARL W. BEYERLEIN
. . . casting buyer, Eaton Mfg.

ANTHONY A. PACK
. . . joins Hyster Co.

A. RASMUSSEN
. . . LaPorte Foundry sales mgr.

JOHN P. McGURY
. . . joins NFA staff

O. He was formerly service engineer, Vanadium Corp. of America, New York.

Earl W. Beyerlein was appointed casting buyer, Cleveland Axle Division and Marion, O., Forge Division of Eaton Mfg. Co., with headquarters in the axle purchasing department, Cleveland, where the home office is located. Mr. Beyerlein was formerly associated with J. I. Case Co., Racine, Wis., and Koppers Co., Pittsburgh.

Clare B. Carlson, until recently supervisor of metallurgical planning, Dow Corning Corp., Midland, Mich., was named manager of the Electrothermic Division, Pittsburgh Lectromelt Furnace Corp., Pittsburgh. A graduate of University of Illinois, he was previously associated with Vanadium Corp. of America, New York, Pittsburgh Consolidation Coal Co., Pittsburgh, and Pittsburgh Metallurgical Corp., Niagara Falls, N. Y.

Anthony A. Pack was named assistant to the president, the Hyster Co., Portland, Oreg. Mr. Pack was graduated from Michigan State College of Agriculture and Mechanic Arts and later studied at Harvard University. He was previously associated with Vickers Inc. and General Motors Corp., both of Detroit.

A. Rasmussen was recently appointed sales manager, Laporte Foundry Co., LaPorte, Ind. Mr. Rasmussen was formerly vice president-plant manager, Fahralloy Corp., Harvey, Ill., which he joined in 1942 as sales manager.

C. Taylor Marshall, since 1953 assistant to the plant manager, Pittsburgh Coke & Chemical Co., Pittsburgh, has been named general manager of the Coke and Iron Division. He was graduated from University of Virginia and joined the company in 1943.

Glen A. Nebel has been appointed West Coast representative, Catalin Corp. of America, New York, with headquarters at 440 Seaton St., Los Angeles. He is a graduate of Northwestern University.

John P. McGury has joined the staff of National Foundry Association, Chicago, where he will assist in expanding its program of labor and employee relations. A graduate of Loyola University, Mr. McGury recently resigned from Kelliher, Bowen & McGury, labor arbitration specialists.

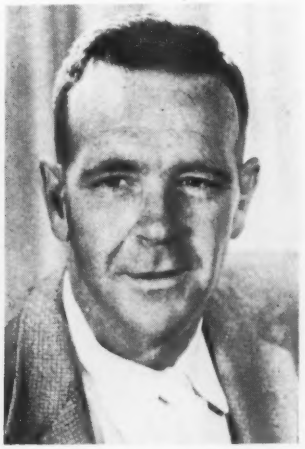
Frank B. Snedecor was appointed manager of the Niagara Falls, N. Y., plant, Titanium Alloy Mfg. Division, National Lead Co., New York, succeeding **Robert B. Easton,** retired. Mr. Snedecor was formerly controller and assistant to the division manager.

Robert J. Sudlow was appointed New England district representative, Frank G. Hough Co., Libertyville, Ill., to assist company distributors in Massachusetts, Vermont, Rhode Island, New Hampshire and Connecticut.

Thomas Rutherford, district sales manager, Midvale Co., Philadelphia, recently was elected president of the

CLARE B. CARLSON
. . . Lectromelt division mgr.

C. TAYLOR MARSHALL
. . . becomes division mgr.

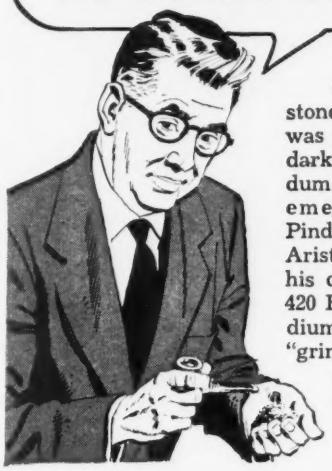


ROBERT J. SUDLOW
. . . joins Frank G. Hough Co.

THOMAS RUTHERFORD
. . . ACI president

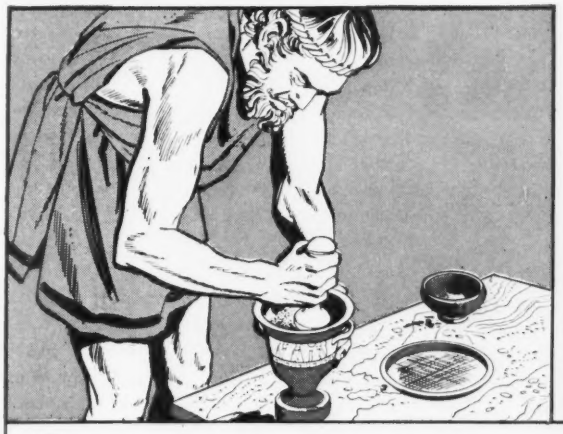
NO. 4 OF A SERIES
ON THE HISTORY OF ABRASIVES
BY CHICAGO WHEEL & MFG. CO.

EMERY WAS USED IN ANCIENT TIMES to abrade and polish metals and other substances.



One of the important milestones in the history of abrasives was the discovery of emery, a dark granular variety of corundum. One of the first to mention emery was the Greek poet, Pindar, who wrote in 500 B.C. Aristophanes also mentions it in his comedy "The Peace," about 420 B.C., referring to it as a medium for "rubbing down" and "grinding down." It was of great value to ancient craftsmen in abrading iron and steel, gems and stone.

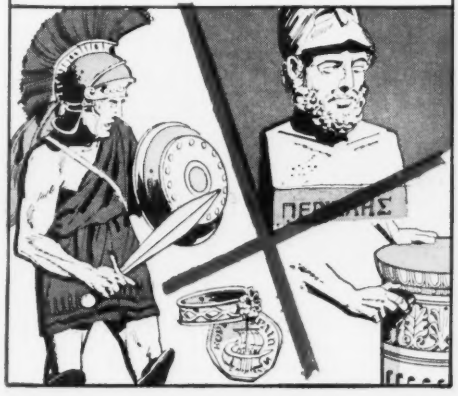
THE GREEK ISLE of Naxos furnished emery to the ancient world. Called the "stone of Naxos" it was highly prized, and brought high prices in the market places of Greece and the Near East.



THE ENTERPRISING GREEKS took the rough chunks of emery stone and ground them to powder. This was sieved for many applications including the polishing of gems. Even then the size of the grain apparently was important for the type of grinding or abrading to be done. Often the rough chunks or pebbles were used.

EMERY, in finely ground form, was sometimes bonded in pottery mixtures and baked to form "whetstones" or grinding stones. We can surmise that these stones were made in various sizes and shapes to suit the work to be done.

THE FINER FINISHES exhibited on tools, implements and weapons after the 4th century B.C. suggest the adoption of better abrasive materials of which emery undoubtedly was the most important. The polishing of metal, gems, statuary and wood carvings was accomplished with emery of various grains.



Emery today is one of the many abrasive substances employed by Chicago Wheel in the manufacture of grinding wheels and mounted points. Over 200 different shapes, sizes and grains of abrasive wheels are made by Chicago Wheel for every metal finishing operation.

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BYRON E. COON
. . . sales promotion, Delta Tool

ROBERT B. HUMPHREY
. . . East-Central regional mgr.

JOHN P. MacCROSSEN
. . . Delta Western regional mgr.

HUGH J. McKANE
. . . Southern mgr., Bay State

Alloy Casting Institute, Mineola, N. Y. Mr. Rutherford was graduated from Lafayette College and joined Midvale in 1916.

Byron E. Coon was named sales promotion-merchandising manager and **John P. MacCrossen,** western regional manager, Delta Power Tool Division, Rockwell Mfg. Co. A graduate of Milton College, Mr. Coon joined Rockwell in 1952 when the company acquired the DeLuxe Saw & Tool Co. He will be located at company headquarters in Pittsburgh. Mr. MacCrossen, who will continue to maintain offices in Oakland, Calif., has been with Rockwell since 1948 and was San Francisco district sales manager for the past 6 years. **Robert B. Humphrey,** since 1951 New York district manager for the Power Tool Division, has become East-Central regional manager, with headquarters in Pittsburgh.

Edward T. Lewis, formerly sales representative in western New York and northeastern Pennsylvania, was appointed district sales manager in Canada, western New York, and northeastern Ohio, for J. H. France Refractories Co., Snow Shoe, Pa. **James F. Myers,** who has covered northwestern Pennsylvania and Canada, was named district sales manager in western Pennsylvania, southeastern Ohio and West Virginia. **Oliver H. Smith,** until recently sales representative in New England and the East, was appointed eastern district sales manager.

Fred W. Elya, for the past 10 years northeastern district manager, Norton Co., Worcester, Mass., resigned recently after 43 years in company sales work. Previously he was abrasive engineer in New York state for 25 years. **Ronald W. Price,** since 1946 Connecticut district manager, was made New England district manager for abrasive sales. He joined the sales organization in 1926.

Herbert Geittman Jr., until recently foundry manager, Richmond Foundry & Mfg. Co., Richmond, Va., has joined the metallurgical development division, Climax Molybdenum Co., New York, with headquarters in the Detroit office. Mr. Geittman was graduated from University of Michigan and was previously associated with Bridgeport Brass Co., Bridgeport, Conn., and the former Phosphor Bronze Smelting Co., Philadelphia.

Harry L. Smith Jr., since 1952 staff manager of product sales, Aluminum Co. of America, Pittsburgh, was elected a sales vice president. A graduate of University of Pennsylvania, he joined Alcoa in 1914. During 1953-54 he was on leave from the company, as director of the Aluminum Division, National Production Authority, and as assistant administrator of the Business and Defense Services Administration, Washington.

Orville T. Barnett, for the past year supervisor of welding research in the metals research department, Armour Research Foundation, Illinois Institute of Technology, Chicago, was named assistant manager of the department. A graduate of Illinois Institute, he joined the foundation last year, after two years as regional sales manager, A. O. Smith Corp., Chicago.

Frank Blum was named general sales manager, P&H Industrial Division, Harnischfeger Corp., Milwaukee, and a member of the executive committee. He will continue as sales manager of the Overhead Crane Division, a position he has held since 1942. Mr. Blum joined Harnischfeger in 1929.

Hugh J. McKane was named southern area district manager, Bay State Abrasive Products Co., Westboro, Mass. Mr. McKane joined the company's Chicago office as an abrasive specialist in 1948 and later was transferred to the southeastern area as abrasive engineer. Previously he was associated with the Carborundum Co., Niagara Falls, N. Y., for 14 years.

R. A. Entringer has been appointed general sales manager, Alcaloy Inc., Trenton, N. J. A graduate of Marquette University, Mr. Entringer was previously employed in the metallurgical departments of Ampco Metal Inc., Milwaukee, Ladish Drop Forge Co., Cudahy, Wis., and Cleveland Forging Division, Aluminum Co. of America, Cleveland. He also was associated in sales with Claud S. Gordon Co. of Cleveland, Ohio, and J. T. Baker Chemical Co., Phillipsburg, N. J.

Delmer C. Wright was appointed Birmingham field sales representative, Laclede-Christy Co., Division of H. K. Porter Co., St. Louis, succeeding **H. D. Roach,** resigned. Mr. Wright was previously associated with Swift & Co., Chicago, and East St. Louis Castings Co., East St. Louis, Ill.

Fred C. Frame has been appointed sales engineer, Salem-Brosius Inc., Pittsburgh. Mr. Frame has been associated with the metalworking industry for approximately 20 years.

Don Palmisano was appointed southern sales representative, Electrode Division, Great Lakes Carbon Corp., New York. Mr. Palmisano,

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Name_____ Title_____

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City_____ Zone____ State_____

JOHN W. SHIER
. . . made assistant general mgr.

BART C. DICKEY
. . . produc.ion, Acheson Colloids

FRED ZAJAC
. . . joins Acheson Colloids Co.

FRANK M. HUNTER
. . . returns to home office

whose offices will be identified with those of the J. B. Hayes Co., Birmingham, sales agent there for the Electrode Division, joined Great Lakes in 1951.

John W. Shier was appointed assistant general manager, Acheson Colloids Co., Port Huron, Mich., and **Bart C. Dickey,** formerly process development engineer for the company, has succeeded Mr. Shier as production manager. **Fred Zajac** recently joined the company as service engineer in northern and lower Michigan, with headquarters in Detroit. He was associated until recently with Jergens Tool Specialty Co., Cleveland. Mr. Zajac succeeds **Frank M. Hunter,** who returned to Port Huron where he will supervise the laboratory phase of the sales engineering program.

John W. Wheeler was appointed abrasive engineer in the western Massachusetts area, Norton Co., Worcester, Mass., succeeding **Robert H. Langdon,** who was made manager of the New York and northern New Jersey districts. Mr. Wheeler was graduated from Rensselaer Polytechnic Institute and joined Norton Co. in 1948. Since 1949 he was a field engineer in the Connecticut district.

Frederick L. Feldmeth was appointed Philadelphia district sales engineer, National Alloy Division, Blaw-Knox Co., Pittsburgh. A graduate of Temple University, he took graduate work at Drexel Institute of Technology. Until recently he was chief engineer, R-S Furnace Corp., Philadelphia.

Ralph G. Mensch was appointed district sales manager, Reichhold Chemicals Co., White Plains, N. Y., with headquarters at the Argo, Ill., plant where he will specialize in sales of phenolic materials. He was formerly sales manager, Acme Resin Corp., Forest Park, Ill.

Dallas C. Amburn, formerly associated with Barrett Division, Allied Chemical & Dye Corp., New York, was appointed assistant industrial sales manager, Swan-Finch Oil Corp., Hackensack, N. J. He will be in the Detroit district office.

Thomas E. Berry, formerly metropolitan New York district sales manager, DeWalt Inc., has been named assistant to the general sales manager, with headquarters at company headquarters in Lancaster, Pa. He attended Yale and Columbia Universities and joined DeWalt in 1953. Previously he was associated with Air Reduction Sales Co., New York.

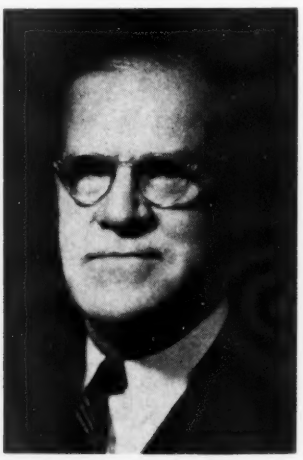
Ra'eigh H. Barnes was named Cleveland sales representative, and **Donald T. Fowler** was assigned to the Evansville, Ind., sales office, Allis-Chalmers Mfg. Co., Milwaukee. **John J. Dwyer** was appointed field service representative in the company's Mid-Atlantic region, with headquarters in Haverford, Pa.

John R. Tuttle was named president-chairman of the board of directors, Crouse-Hinds Co., Syracuse, N. Y. Retiring from active management but continuing as directors are **William L. Hinds,** who was named board chairman in 1947, **Albert F. Hills,** who became president in 1951, and **W. C. Blanding,** executive vice president since 1951. Mr. Tuttle, a

JOHN W. WHEELER
. . . abrasives sales, Norton Co.

RALPH G. MENSCH
. . . Reichhold district sales

DALLAS C. AMBURN
. . . joins Swan-Finch Oil Corp.



JOHN R. TUTTLE
. . . heads Crouse-Hinds Co.

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- Makes metal pure and clean.
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- Thinner, yet stronger sections can be poured.
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- Crucible or furnace linings are kept clean.
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- Saves considerable tin and other metals.
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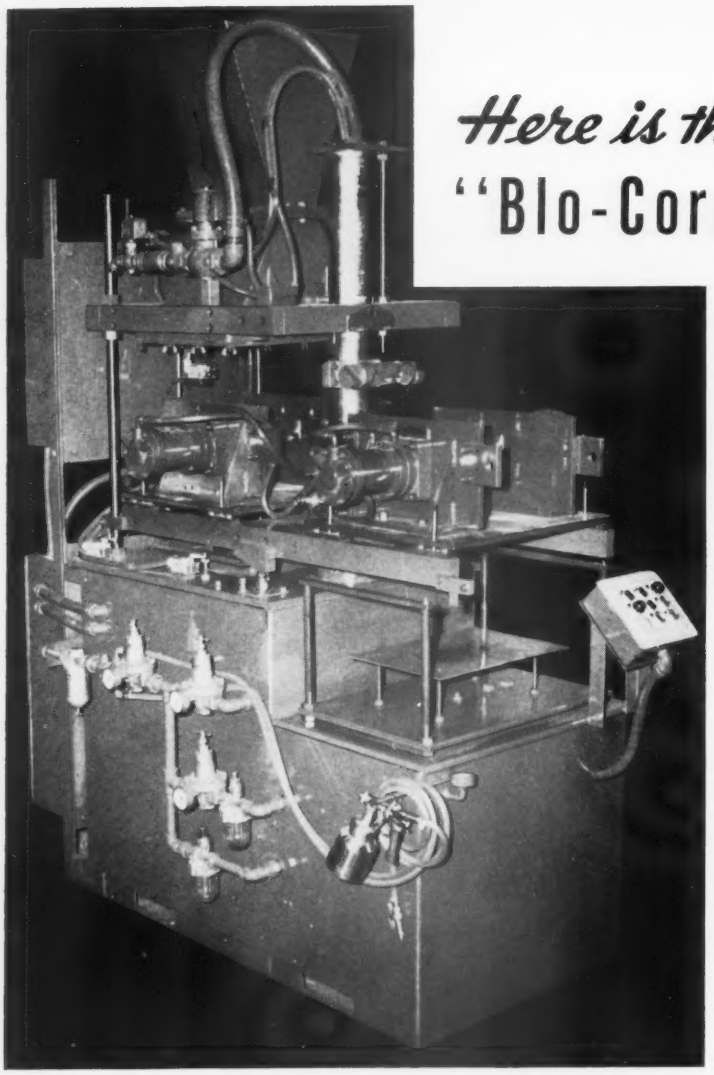

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(hollow or solid)

and

SHELL MOLDS

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Also available are horizontal parting fixtures for handling patterns up to 15"x20" with 14" maximum draw.

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- **Patterns up to 15"x20" with 14" draw.**
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graduate of Yale University, joined the company in 1933 as controller, became a director and secretary in 1943 and was vice president-treasurer since 1951.

Elmer O. Bischoff, controller, Grede Foundries Inc., Milwaukee, was elected a director of the Milwaukee Control, Controllers Institute of America, New York. **John R. Kahler,** secretary-treasurer, Sandusky Foundry & Machine Co., Sandusky, O., and **Robert Rasmussen,** plant controller, Doehler-Jarvis Division, National Lead Co., Toledo, have been named directors of the Toledo Control. **John P. Bodle,** secretary-treasurer, Portland Forge & Foundry Co., Portland, Ind., was named to serve on the Fort Wayne Control.

David C. McVey recently joined Climax Molybdenum Co., New York, as sales development manager. A graduate of Carnegie Institute of Technology, he was formerly a metallurgist with International Harvester Co., Chicago, and plant metallurgist, Propeller Division, Curtis Wright Corp., Dayton, O.

Robert Duffy has been appointed Milwaukee district manager, Lindberg Engineering Co., Chicago, succeeding **Robert Onan,** who has become president, Waukee Engineering Co.,

ROBERT DUFFY
. . . Lindberg Engineering mgr.

Milwaukee. **Robert Foley** has succeeded Mr. Duffy as Chicago sales manager.

Dr. B. D. Thomas, David C. Minton Jr., and **John S. Crout,** who have long been associate directors of Battelle Institute, Columbus, O., were recently appointed vice presidents. Dr. Thomas has been on the Battelle staff 21 years. Messrs. Minton and Crout joined the institute in 1941.

Robert G. Callison, formerly sales manager, was elected vice president-regional sales and promotion, Peters-Dalton Inc., Detroit. Mr. Callison has been with the company for 18 years. **T. Kenneth McGuire,** general manager of the company's industrial sheet metal division, was named general sales manager.

James E. Quigley was appointed sales representative, National Crucible Co., Philadelphia, to cover eastern Pennsylvania, New Jersey, New York City, Maryland and Delaware.

Robert H. Jacoby has been appointed sales-service representative, St. Louis Coke & Foundry Supply Co., St. Louis. Until recently he was chief metallurgist and manager of quality control, The Key Co., East

ROBERT H. JACOBY
. . . St. Louis Coke sales

St. Louis, Ill., which he joined in 1938 as assistant metallurgist in the steel foundry.

Robert L. Williamson was appointed manager of pig and ingot sales, Aluminum Co. of America, Pittsburgh. Mr. Williamson, since 1951 product manager of die casting sales, attended Purdue University and joined Alcoa in 1929 after graduation from University of Missouri.

Carryl A. Asher, vice president, Electro Refractories & Abrasives Corp., Buffalo, has been appointed eastern sales manager of its Grinding Wheel Division. **A. D. Stover** was named Detroit district manager, and **John Hume Jr.,** Chicago district manager, for the division.

T. E. Ward was elected president-treasurer, Badger Malleable & Mfg. Co., South Milwaukee, Wis., succeeding the late C. McLeod Lewis. Mr. Ward was formerly secretary treasurer. **W. J. MacNeill** was named vice president-operations, **Leo Joerg,** secretary and **August Schwan,** assistant treasurer of the company.

William N. Davis was appointed manager of exhibits, American Foundrymen's Society, Des Plaines,

WILLIAM N. DAVIS
. . . exhibit manager, AFS

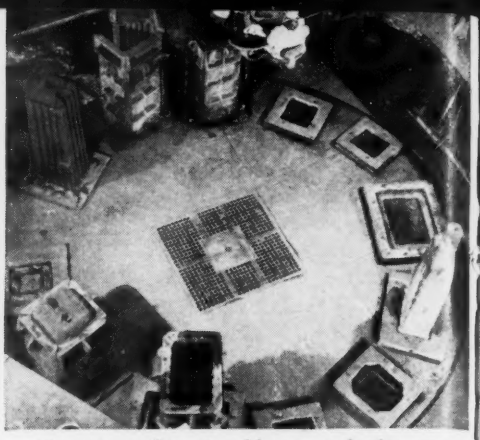
Ill., succeeding **A. A. Hilbron,** who resigned earlier this year. **H. J. Weber** becomes director of the society's Safety & Hygiene & Air Pollution Program, which Mr. Davis has headed since he joined the society in 1952. Mr. Davis was graduated from Massachusetts Nautical School and later did postgraduate work at Wayne University. From 1948-1952 he was senior engineer with National Safety Council, Chicago, as consultant to the foundry and other metals industries on safety practices. Mr. Weber was graduated from DePaul University and took his engineering degree at Illinois Institute of Technology. For the past 12 years he was chief industrial hygienist, American Brake Shoe Co., New York.

W. Frank Gamble recently joined the Whirl-Air-Flow Corp., Chicago, as office manager. Mr. Gamble was previously secretary-treasurer, Hydro-Blast Corp., Chicago.

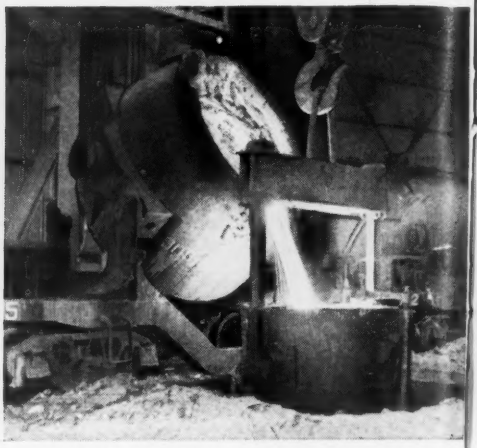
L. P. Metesser, West Coast representative in San Francisco for the Cleveland Vibrator Co., Cleveland, has added Idaho, Utah and Arizona to his territory.

David A. Crawford has retired as chairman of the Michiana Products Corp., Michigan City, Ind. Nathaniel E. Duval continues as president of the corporation.

Molds and cores are made on four turntables, each 25 ft. in diameter. U. S. Steel engineers worked closely with Giffels & Vallet in developing these tables and other special equipment for the new foundry.

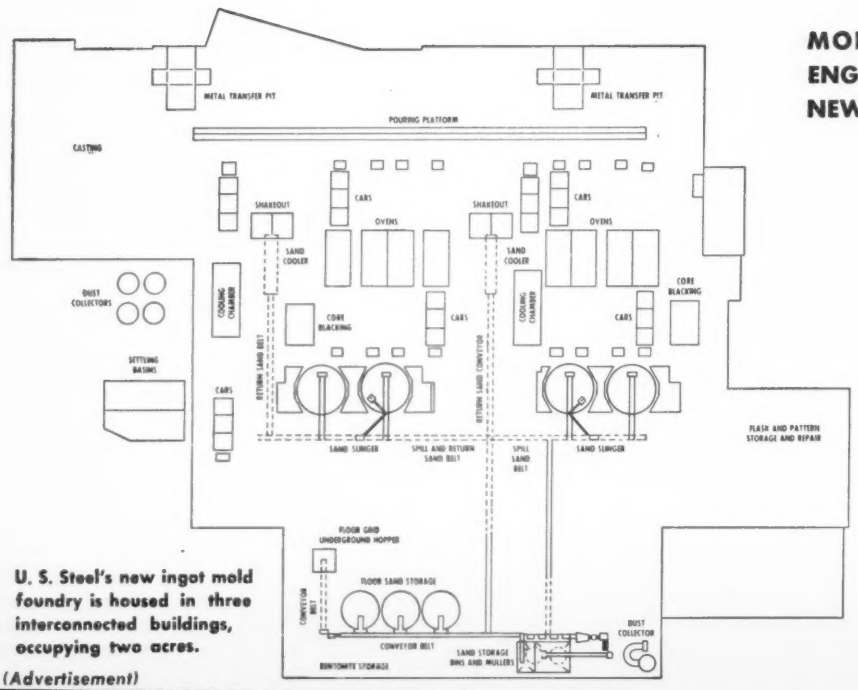


Five stages of ingot mold core production are shown in this view. Molder perched on sand-slinger rams the cores in rotation.



Electrically tilted 75-ton blast furnace ladle pours molten cast iron into 20-ton bottom-pour ladles.

How U.S. Steel Increased Ingot Mold Production to 1,055 Tons per Day!



U. S. Steel's new ingot mold foundry is housed in three interconnected buildings, occupying two acres.

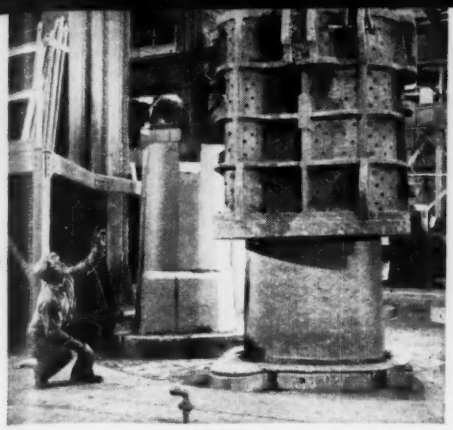
(Advertisement)

MODERN MECHANIZED FOUNDRY FACILITIES ENGINEERED BY GIFFELS & VALLET, INC. PROVIDE NEW EFFICIENCY, BETTER WORKING CONDITIONS

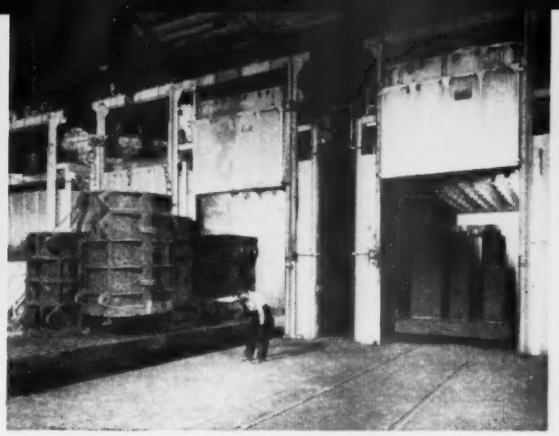
United States Steel's new ingot mold foundry at their Edgar Thompson Works in Braddock, Pa. is perhaps the largest and most modern facility of its kind in the steel industry today! Capable of producing 275,000 tons of ingot molds annually, it answers the company's need for greater production at lower cost, and provides safe, healthy working conditions for personnel.

This installation, with its many new methods and facilities, was developed through the close teamwork of U. S. Steel engineers and Giffels & Vallet, Inc. As the project progressed from initial surveys and basic planning to a finished operating foundry, the extensive facilities of both organizations were coordinated on all phases of design, engineering, specification and construction. G&V's extensive background of foundry experience was drawn upon repeatedly to take full advantage of the most effective methods and designs.

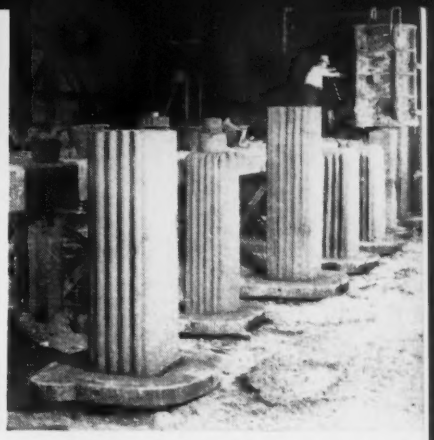
To accomplish the production-requirement goals set up by U. S. Steel, mechanization was employed wherever possible and practical. Special conveyor systems, bulk-handling el



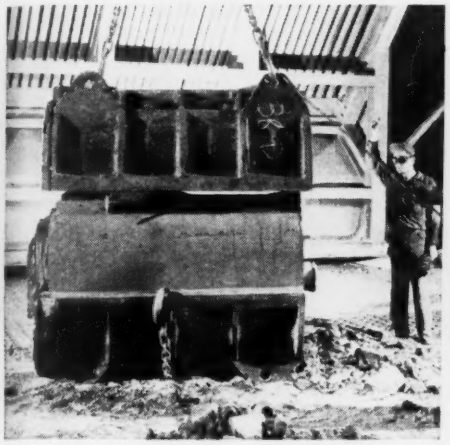
Ingot mold flask is lowered into position on turntable before automatic sandslinger rams molding sand into place.



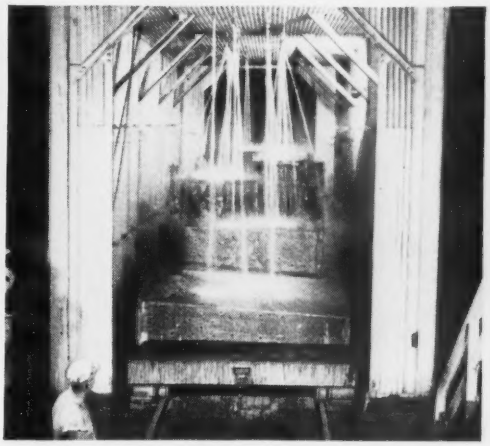
Four automatically controlled ovens dry sand molds and cores preparatory to casting of ingot molds.



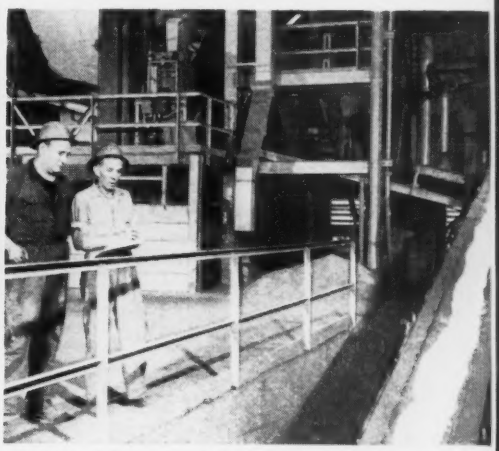
One of three pouring stations where ingot mold interiors are formed by modern methods and facilities.



Sand from the flask clings to solidified ingot mold as sections of the flask are removed.



Water spray quickly cools barrels and flask rigs as they move through cooling chamber on cars.



Sand from the shakeout grid is automatically returned to 200-ton storage bin on this inclined conveyor belt.

vators and other material handling equipment were designed to meet specific problems. Both equipment and buildings were planned to provide the utmost in safety and pleasant, healthy working conditions.

Material handled and processed by automatic systems

The foundry is housed in three interconnected buildings: the sand preparation department, the ramming-molding and drying ovens departments, and the casting department. Washed and dried silica sand is brought into the sand preparation building, unloaded into a hopper below floor level and emptied onto a second conveyor belt. The belt moves sand across the building and drops it through chutes into either of two elevated 50-ton storage bins.

Bentonite bond is emptied five bags at a time into a pneumatic handling system and distributed to five 10-ton hoppers. Used sand from the shakeout is returned on a conveyor belt to the sand preparation department. Sands, bentonite and water are fed automatically into two 2,200 lb. capacity sand mullers by means of a control panel which also controls the mixing cycle. Sand is then automatically discharged onto a 70 ft. conveyor belt which empties it into a 20-ton sandslinger near the ramming and oven departments. At all points in the building where there is any possibility of a dust problem, a powerful exhaust system carries the air to a dust collector

Ramming-molding operations and the drying ovens are housed in a 127 x 286 ft. building. The ramming-molding department contains two complete molding sections running parallel to each other. Each is comprised of a motive-type sandslinger, two turntables 25 ft. in diameter, four drying ovens, a shakeout unit, and a flask and barrel cooling chamber.

Four giant turntables serve ramming-molding department

Turntables are of massive construction and are rotated by electrically driven pinions. The tables are partially surrounded by an elevated platform from which operators set spouts, finish tops of molds and cores, etc. Cores are usually made on one turntable, and molds on the other, however, both can be made on one table. Spill sand from the ramming operation is swept into an open grid in the center of the turntable, where it falls into a hopper and is returned to the sand preparation building.

Completed sand molds and cores are picked up by three 35-ton cranes and loaded on cars which carry them into gas-fired recirculating-type drying ovens. Molds and cores dry 4 to 6 hours, depending on size, and then are pulled into the casting department and unloaded from the cars. Recording-type instruments control cycle and temperature of the ovens.

The 100 x 360 ft. casting department is served by three 75-ton cranes, and three 25-ton auxiliary hoists. Molten cast iron is brought from a blast furnace nearby in special 75-ton oval-shaped ladles with electrically-operated tilting mechanisms. Molds are filled from 20-ton bottom-pour ladles. After the metal has solidified, molds are placed on the shakeout grid by cranes, disassembled, and the flasks and core barrels are moved on cars into a cooling chamber. Numerous water jets in the top of the chamber rapidly reduce the temperature of flasks and core barrels, thus permitting easier handling and more rapid turn-around.

Coordinated dust control and ventilation systems provide clean air

An exhaust hood at the back of the shakeout grid exhausts dust-laden air from above and below the grid at the rate of 66,000 cfm. Four wet-type dust collectors located outside the building remove dust from the air with water sprays. Sand removed from castings on the shakeout grid drops into hoppers and is transferred to an inclined rotary sand cooler where it is cooled by water sprays.

In addition to dust-collection hoods at critical points, adequate ventilation to insure comfortable working conditions is provided by five propeller-type exhaust fans mounted in the roof of each building. The combined ventilation systems can change the air in the building 14 times an hour. Numerous steam-type unit heaters are located to cover overlapping areas. The heating system can supply a total of 2,000,000 BTU per hour.

For more than thirty years G&V's comprehensive planning-engineering services have pointed the way to greater output, lower costs and improved casting quality for foundries across the nation. This flexible service can be used to plan, engineer and supervise an entire project, or to supplement the facilities of your own engineering department.

Whether it's a complete new plant, or the modernization of present facilities, G&V services will meet your requirements for low-cost, high-output production. These services are discussed in a special Foundry Brochure. A copy will be mailed on request.

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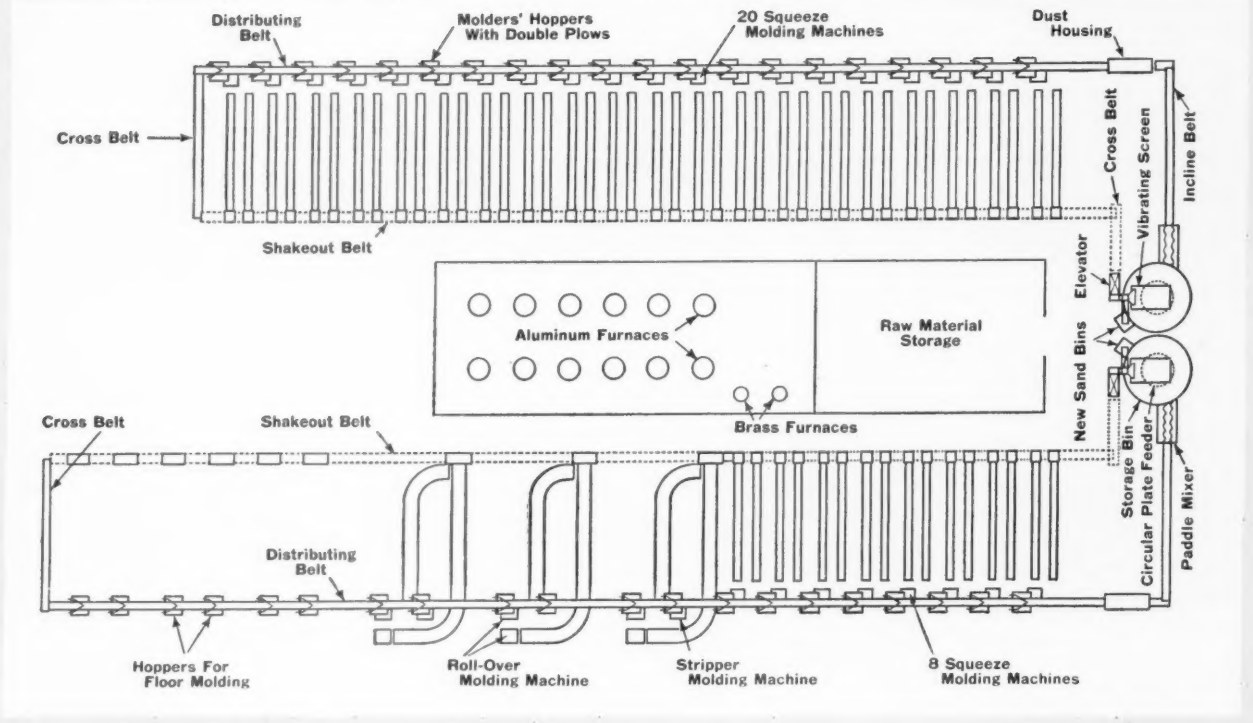


View of general layout of new aluminum foundry shows the arrangement of departments

NEW ALUMINUM FOUNDRY

Has Mechanized Sand Handling System

By JOHN L. LIVINGSTON
Assistant Plant Engineer
Crouse-Hinds Co., Syracuse, N. Y.

WHAT is the solution to the problem of boosting production in an aluminum foundry where job runs are short (from 100 to 1000 pieces) and patterns are changed several times daily?

For Crouse-Hinds Co., Syracuse, N. Y., manufacturer of a diverse line of electrical equipment that requires cast aluminum housings, the answer was a new, 48,000-sq-ft foundry. The new plant is equipped with two completely mechanized sand handling systems that together deliver 70 tons of prepared molding sand an hour to 28 squeezer molding stations and 6 large rollover and stripper stations. By the end of this year, the new plant is expected to lift output of aluminum castings by 40 to 50 per cent.

Formerly, both the aluminum and iron foundries at Crouse-Hinds were housed in one building. Lack of adequate work space limited both operations; the grinding and cleaning rooms were jammed, piles of sand obstructed the molding machines, and molds for nonferrous castings were set and poured by hand and hoist.

With the addition of the new foundry, floor space for all casting operations at Crouse-Hinds now totals 149,832 sq ft. The area formerly occupied by the aluminum foundry has been added to the molding and core departments of the iron foundry.

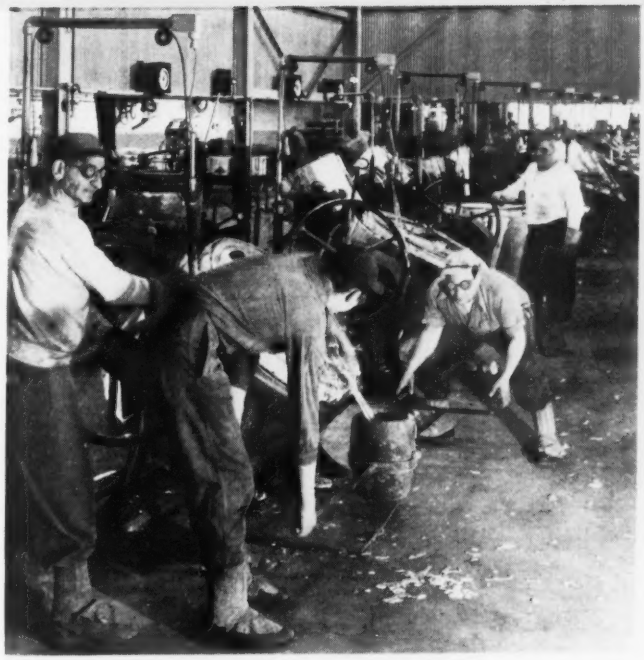
Casting operations in the new aluminum foundry are centered around two similar sand conveyor systems, each running lengthwise along the sides of the plant. Between the systems is a central melting area, shielded on four sides by a large aluminum apron extending from the roof down to within 8 ft of the floor. Located in the roof above the melting area are several exhaust fans. These fans exhaust gas fumes and hot air at the rate of 90,000 cfm while an intake system simultaneously replaces, heats, filters and humidifies an equal amount of fresh air.

Several production efficiencies have resulted from the foundry's centralized furnace area: (1) furnace fumes are more easily exhausted, (2) gas furnaces are fed from one underground manifold, (3) to minimize the accumulation of surface oxides, molten aluminum is carried only short distances.

To increase floor space, columns have been minimized by suspending sand hoppers, overhead sand conveyors and footwalks from the roof trusses.

Molding machines on each side of the foundry differ. All 20 squeezer molders on one side and eight identical machines on the other handle smaller-sized molds. These eight stations also share sand with three combination rollover and stripper molding machines and three similar units,

Illustration shows a long view of foundry. Each of the squeezer stations is flanked by three lines of gravity conveyors slightly elevated at opposite ends; to facilitate the easy movement of molds, bottom boards and bands



Between sand handling systems is furnace area. It is shielded on four sides by a large aluminum apron

Counterweight plates refill hopper automatically by raising or lowering plow on feed belt

which are equipped with overhead cranes for handling and closing large molds.

Each squeezer station is flanked by three lines of gravity conveyors, slightly elevated at opposite ends to allow easy movement of molds, bottom boards and bands. Roller conveyors near the roll-over and stripper machines also are used for handling drags, setting cores and closing molds. Molds are placed on these conveyors for pouring, cooling, and transfer to shakeout.

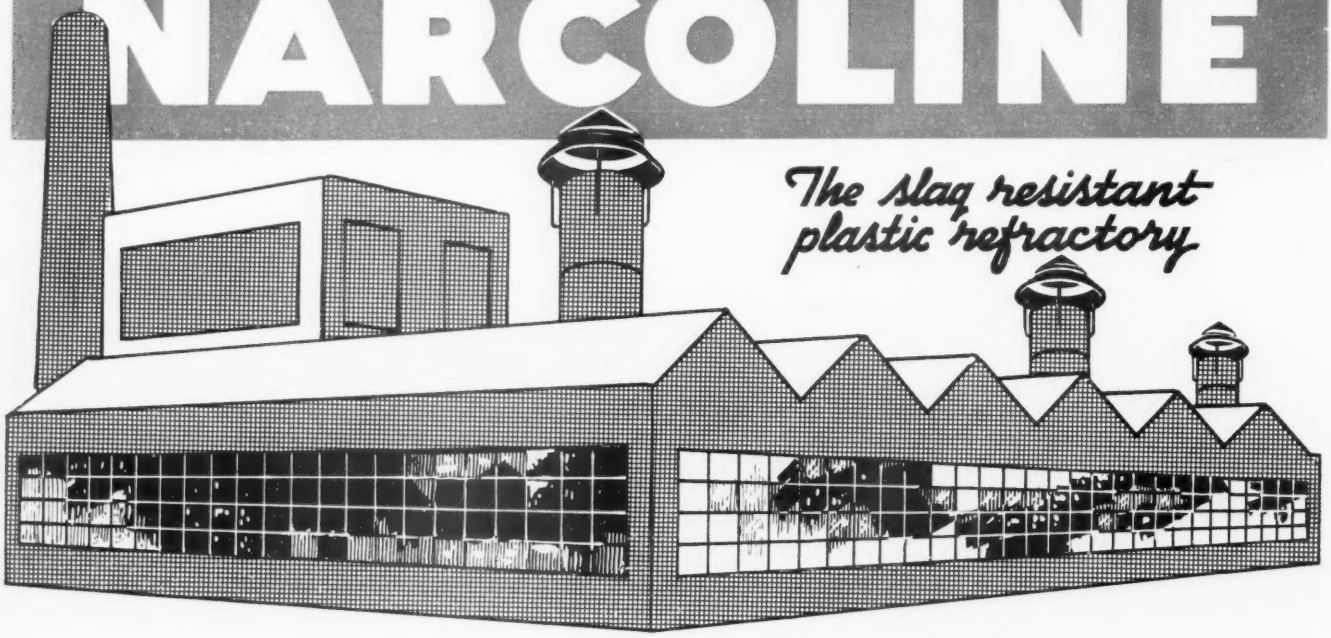
From this point, shakeout sand removal for both sides of the foundry is handled identically by the two systems. An underfloor slider belt collects and carries used sand from the shakeout of each molding station to duplicate preparation units at the back of the foundry. These units include cross belts with magnetic pulleys for removing ferrous scrap, bucket elevators, vibrating screens and 100-ton storage bins.

After cooling, castings that vary from 6-in. thin-section lamp guards to 40-in.-long traffic signal controller housings, are packed into tote trucks for transfer to the grinding room.

Withdrawn from the storage bins by plate feeders, the stored sand is

Consider these points about

NARCOLINE



SLAG & DROSS . . . . . . Its peculiar resistance to slag and its remarkable ability to withstand the attack of molten iron recommends NARCOLINE for lining cupola spouts and runners, for patching below the metal line, for making tap holes in the cupola, for lining small furnaces melting copper and brass, for making repairs to furnace bottoms, etc.

CRACKS & SPALLS. . . . . . If any refractory product gets much too hot or much too cold much too quick it is likely to spall or crack. The manufacturers of NARCOLINE got around this troublesome point by combining highly refractory graphite with their superior fire clay—and as a result, normal spalling has been reduced to a minimum.

HANDLING & STORAGE . . . NARCOLINE is shipped in 100 lb. cartons, very convenient to handle. This product can be stored for months without losing its special factory-produced consistency and freshness, thanks to its tough, moisture-proof red polyethylene wrapper.

INSTALLATION . . . . . . NARCOLINE is cut in slices, or slabs, which are put in place and pounded firm with a steel hammer or an air hammer. For estimating purposes, allow 145 lbs. of NARCOLINE for each cubic foot of furnace or ladle lining.

NARCO

NARCOLINE resists molten metal and corrosive slag, stands up under rough thermal shock, and is easily removed from cold ladles, together with slag and skull. It is efficient, effective and economical, and if you haven't tried it yet, you really should.

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spilled into the paddle mixers, where moisture is added. Reconditioned for molding, the sand passes by belt conveyors to aerators, which discharge it onto two hopper feed belts. Running above the molding sand hoppers, these belts carry the sand the length of each side of the foundry to the molders' hoppers.

To refill a particular hopper, counterweight plates, operated by sand already in the hopper, automatically raise or lower a plow on the feed belt. When lowered, the plow forces sand off the belt into the hopper; when raised it allows the sand to continue traveling forward to the next hopper or beyond to the end of the distribution line. Any material reaching the final cross belt is carried back to the shakeout belt, thereby forming a closed circuit.

The foundry is kept dust-free by a wet-type exhaust duct system, which removes dust from the shakeout spill belts, elevators, sand storage bins and vibrating screens.

A single panelboard controls all electric motors in the sand handling system. The motors also are interlocked to shut off automatically in the event one motor fails. This control prevents sand from piling on the shakeout belts, shakeout screen or apron conveyor.

ASM Metallographic Exhibit Scheduled for Philadelphia

The 10th Metallographic Exhibit of the American Society for Metals will be held at the 1955 National Metal Congress and Exposition in Philadelphia, Oct. 17-21. Twelve classifications of micros are designated for the 1955 contest.

Subjects include carbon and alloy steels; stainless steels and heat-resisting alloys; cast and wrought iron; aluminum, magnesium, beryllium, titanium and their alloys; copper, nickel, zinc, lead and their alloys; metals and alloys not otherwise classified; micros showing transitions or change during processing; welds and other joining methods; surface phenomena; results by unconventional techniques (not electron micrographs); slags, inclusions, refractories and cermets; and micrographs in color.

A grand prize of $100 will be presented for the best entry in the show. Blue ribbons will be given the best entry in each classification, with honorable mentions to others.

Book Traces 3M History

The story of abrasives and adhesives and their contributions to the metal trades is the subject of a new book, *Brand of the Tartan*, by Virginia Huck. The volume traces the 53-year history of the Minnesota Mining & Mfg. Co., St. Paul, developers of abrasive discs, abrasive cloths and industrial adhesives used in the metals industry. It is published by Appleton-Century-Crofts Inc. at $3.50 per copy.

MICHIGAN AND INDIANA GRAY IRON FOUNDRYMEN MEET

View of Michigan and Indiana gray iron foundrymen who held their first regional meeting recently

MICHIGAN AND northern and central Indiana management and cost groups of the Gray Iron Founders' Society recently held their first regional meeting. Over 70 executives met May 13 in Marshall, Mich., at Schuler's Inn. GIFS officers C. H. Ker, Dalton Foundries, Warsaw, Ind., president; Tom White, Bostwick Foundry, Lapeer, Ind., district director; and Don Workman, Cleveland, executive vice president, attended the meeting.

General chairman was Vern Sadler, General Foundry & Mfg. Co., Flint, Mich. He thanked Jack Meyer, Interstate Foundry Co., Indianapolis, and F. X. Gartland Jr., Atlas Foundry Co., Marion, Ind., chairmen of the central and northern Indiana management groups respectively, for their co-operation.

After a few words of welcome from Don Workman, Mr. Sadler introduced Eugene Hinze, E. T. Runge & Associates, Cleveland, who serves as a regional cost consultant for the three groups. Mr. Hinze presented cost comparisons which included figures for all three groups on a single blueprint. Later he led a cost discussion in which everyone present was invited to participate. After the cost discussion, Mr. Meyer and Mr. Gartland led a roundtable discussion on material costs, operating rates, business outlook and similar topics.

Following lunch, John Wolfe, Midwest Foundry Division of L. A. Darling, introduced Lee Shaw of Seyforth, Shaw & Fairweather, a Chicago law firm specializing in industrial management. Mr. Shaw presented a practical analysis of current labor-management problems.

Fig. 1—Open mold and the pattern used to make it. Notice the gate cores employed to pour the plate

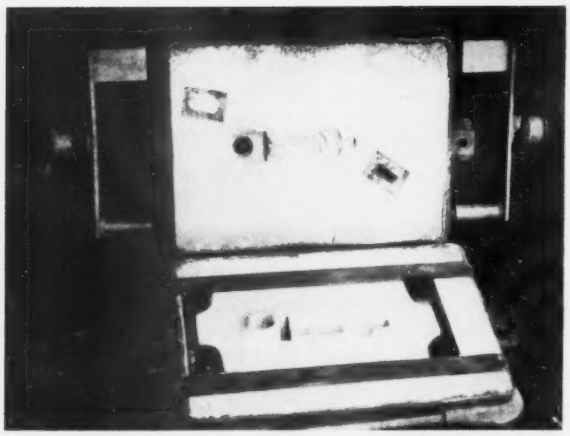


Fig. 2—The next step is shown in this view. Bars and end spacers have been put in place in the mold

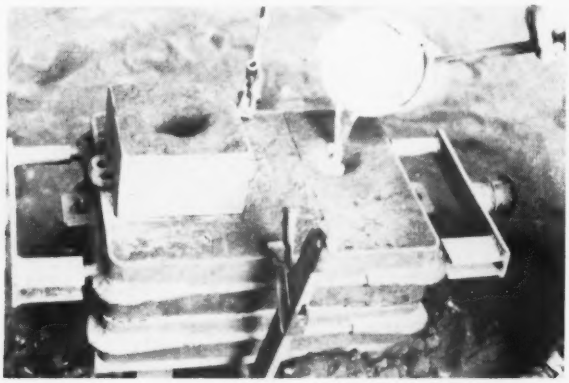


Fig. 3—Riser is built up to a greater height than rest of mold, which is poured at a 15-degree angle

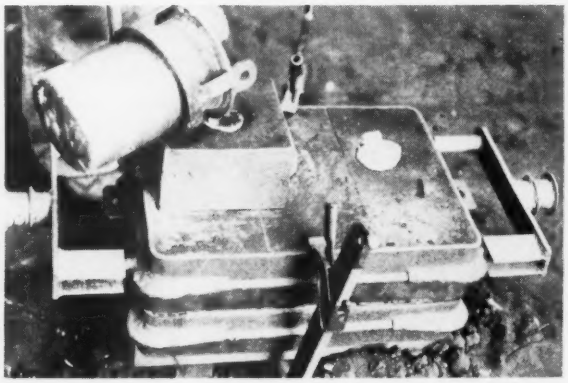


Fig. 4—Final step, after the gate, shown on right, has frozen, is to fill the riser with molten metal

The Sand-Cast Matchplate

By H. F. DIETRICH
Head, Foundry Department
Kansas State College
Manhattan, Kans.

THE SAND-CAST MATCHPLATE probably was used to make molds in which were cast the hinges for the Ark. It will bring back nostalgic memories to oldtimers who graduated from the shaped follow board to the matchplate as an improvement in production technology.

With the advent of the pressure-cast matchplate, the sand-cast plate became less widely used. It is described here because it is an inexpensive and easy method of making a production pattern from a loose master. For small repair items that do not require absolute dimensional accuracy, the sand-cast matchplate can be made in a corner of a shop and will serve the purposes of such jobs perfectly.

Although we think of the matchplate in terms of high production, unusual skill of workmanship, expensive special equipment and special metallurgical control, this need not be true for the small item used in the average shop. Many small patterns lend themselves to matchplate work. The small cost of production is offset by the advantages of the matchplate over the loose pattern. Some of these advantages are discussed in the paragraphs immediately following and may be of interest.

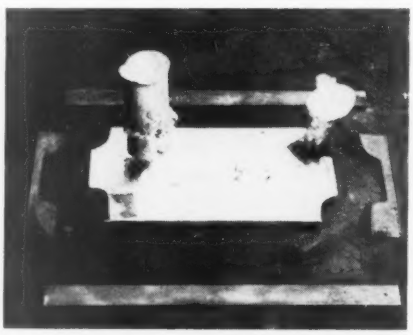


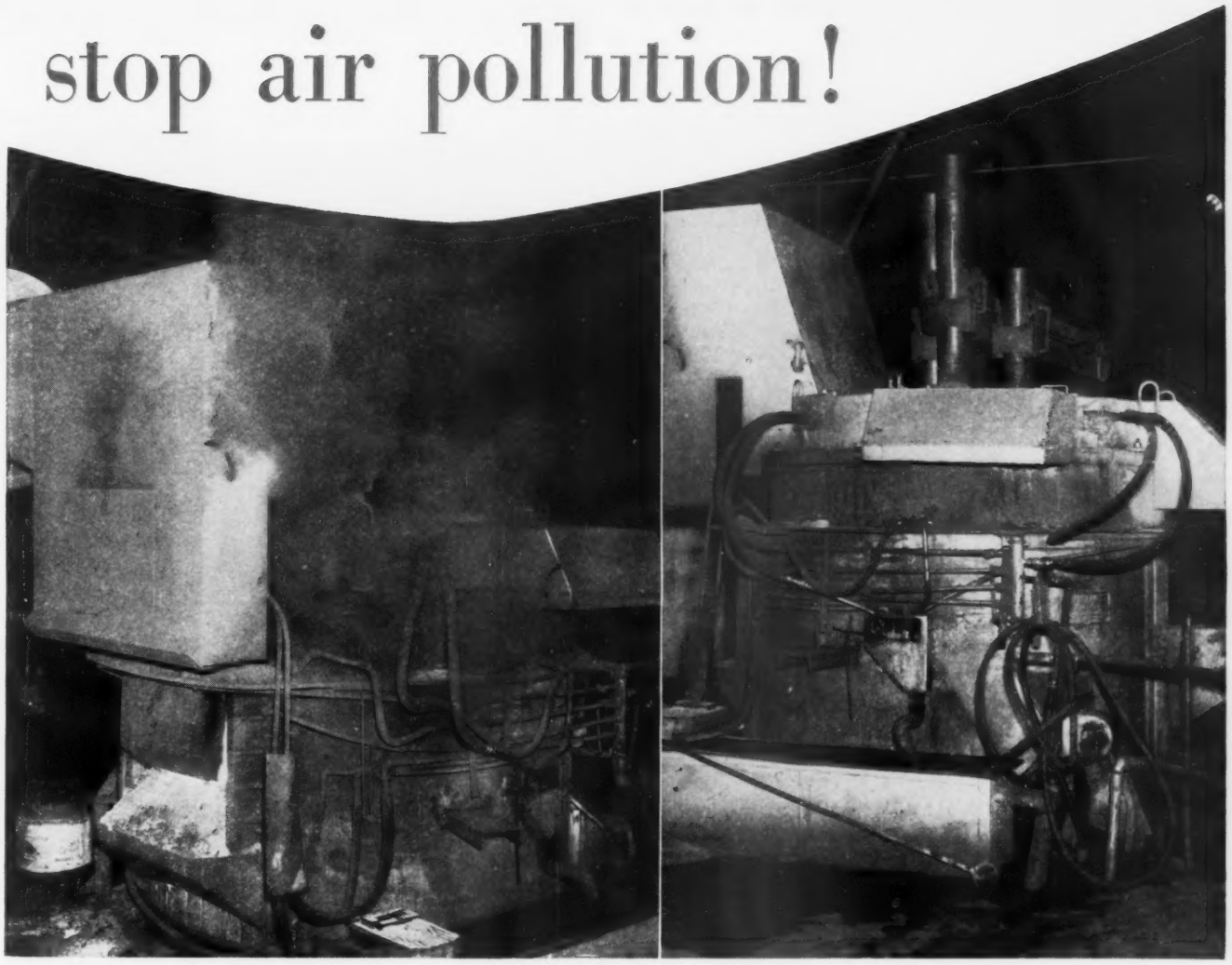
Fig. 5—View illustrates cast matchplate and the spacer bars

For one thing, the storage of a matchplate is more convenient than the storage of a loose pattern. Most foundries have indexed storage facilities for production patterns, but loose patterns must be located by searching through bins of similar patterns. For patterns that require sand matches, the space used for storage is out of proportion to the size of the pattern.

A matchplate is also insurance against breakage of delicate patterns. The additional thickness of the plate added to the pattern makes it practically unbreakable. For the pattern of irregular parting, the time consumed in making a plate is not so great as the time necessary to make a hard sand match.

In addition the matchplate prevents the use of patterns for castings. With items that are used for repair work, the danger always exists that someone in a hurry will use the pattern instead of waiting for cast-

stop air pollution!



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ings to be made for the job.

Finally, there is less likelihood of losing small patterns when they are incorporated into a matchplate. Illustrated in this article is an "Oscar" statuette used by the dramatic department of Kansas State College. Although production on this pattern is not high, it was incorporated into a matchplate to protect the pattern and facilitate molding of the item.

The materials needed to make a matchplate can be found in any foundry. They include the pattern to be used as the master; a matchplate flask of sufficient size and

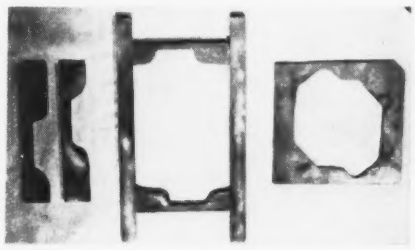

Fig. 6—Use end plates of various widths or cut out special shapes to fit special flasks

of accurate construction; hand tools and other regular molding material and equipment; and steel bars to be used as spacers.

The old method of providing the space between the cope and drag for the thickness of the plate was to build a layer of sand to the desired depth. By using spacer bars, we can save time in making the mold and insure correct thickness of the plate because the mold cannot be clamped off. For small plates, a spacer can be cut to design for the pattern plate, or flat bar stock can be cut to a length permitting the matchplate flask to rest on the bars. The bars then can be spaced to accommodate variable plate dimensions. Length and width of the plate are governed by placing shaped end spacers between the bars. These end spacers can be cut out with a torch and ground smooth.

Molding technique is no different from that of careful loose molding. The same tools and materials are used. A facing of new sand is riddled through a fine riddle to insure smooth parting surfaces and accurate partings. To prevent later excessive scraping and finishing, the mold should be rammed firmly and evenly, thus avoiding metal penetration and roughness.

Because of the irregular parting of the "Oscar" pattern, it was necessary to ram a false cope in which to bed the pattern. The false cope was rammed on a smooth, level board, and the rough bed was cut in such a way as to leave as much of the surface undisturbed as possible.

Allowance must be made for the *inside* dimension of the flask to be used for casting. An irregularly shaped pattern placed too close to the flask limits will cause a part-

THEME OF THE NEW ENGLAND CONFERENCE

Will be Operation of Small Foundries

OPERATIONS of small foundries will receive primary attention at the annual regional foundry conference to be held Oct. 14-15 by the New England Foundrymen's Association in co-operation with the Massachusetts Institute of Technology and other technical groups of the area.

The two-day meeting will be held on the MIT campus, with registration headquarters in the lobby of Building 7 at 77 Massachusetts Ave., Cambridge.

Papers to be presented at both the ferrous and nonferrous sessions will emphasize the application of principles to the small shop—a 6 to 16 molder foundry.

The annual conference dinner is scheduled for Friday evening at the MIT Faculty Club, 50 Memorial Drive, Cambridge.

Henry G. Stenberg, Draper Corp., Hopedale, Mass., is chairman of the committee on conference arrangements, and Howard B. Nye, Crompton & Knowles Loom Works, Worcester, Mass., is vice chairman. Clyde Armstrong, Warren Foundry & Pipe Corp., Everett, Mass., is in charge of the ferrous program. Chairmen of the nonferrous program are Frank Volpe, Somerville Machine & Foundry Co., Somerville, Mass., and Julius Ferrari, Gorham Mfg. Co., Providence, R. I.

The registration and reception committee includes John H. Orrok, Debevoise-Anderson Co., Boston, as chairman and Herbert H. Klein, Klein-Farris Co., Boston, as treasurer.

Other conference committee members are Alexander Beck, Whitman Foundry Inc., Whitman, Mass.; Frank Benoit, Brown & Sharpe Mfg. Co., Providence, R. I.; Thomas I. Curtin Jr., Waltham Foundry Co., Waltham, Mass.; Joseph Burke, Lowell Iron Foundry, Lowell, Mass.; Ahti A. Erkkinen, Builders Iron Foundry, Providence, R. I.; Henry M. Frechette, Fitchburg Foundry Inc., Fitchburg, Mass.; James Hamblin, Saco-Lowell Shops, Biddeford, Me.; Fred Holway, Mystic Iron Works, Everett, Mass.; Charles W. Hutchins, Standard Foundry Co., Worcester, Mass.; William Hale, Springfield Foundry Co., Springfield, Mass.

Warren Murdock, Acme Foundry Co., Chelsea, Mass.; William Naughton, Whitehead Bros. Co., Providence, R. I.; Albert M. Nutter, E. L. LeBaron Foundry Co., Brockton, Mass.; Daniel Pendergast, Sterling Wheelbarrow Co., Boston; C. P. Randall, Hickman, Williams & Co., New York; Harry Sleicher, Seaboard Foundry Inc., Providence, R. I.; Prof. Howard F. Taylor, MIT, Cambridge, Mass.; Alexander S. Wright, Springfield Facing Inc., Willamansett, Mass.; C. A. Wyatt, Debevoise-Anderson Co., Boston.

Program details follow:

Friday, Oct. 14

9 a.m.—**Registration.**

10 a.m.—**Address of Welcome:** C. Richard Soderberg, dean of engineering, MIT. Chairman, Henry G. Stenberg, Draper Corp., Hopedale, Mass.

10:15 a.m.—**Ferrous and Nonferrous Session:** "Green Sand Casting Finish," Raymond F. Meader, Whitin Machine Works, Whitinsville, Mass. Chairman, William J. Francis Jr., Draper Corp., Hopedale, Mass.; co-chairman, Thomas I. Curtin, Waltham Foundry Co., Waltham, Mass.

1:30 p.m.—**Ferrous Session:** "Effect of Gases and Trace Elements on Cast Iron," Fred C. Barbour, metallurgical engineer, Pig Iron Division, Republic Steel Corp., Cleveland. Chairman, Frank A. Soukup, the Bullard Co., Bridgeport, Conn.; co-chairman, William Sommers, Plainville Casting Co., Plainville, Conn.

1:30 p.m.—**Nonferrous Session:** "Crucibles and Refractories: Their Care and Maintenance," George T. Hubbell, sales manager, American Refractories & Crucible Corp., North Haven, Conn. Chairman, F. D. Volpe Jr., Somerville Machine & Foundry, Somerville, Mass.; co-chairman, George Morgan, Warwick Brass Foundry, Warwick, R. I.

3 p.m.—**Ferrous Session:** "Economical Mechanization of Small Foundries," Chester Thomas, National Engineering Co., Chicago. Chairman, Warren Murdock, Acme Foundry Co., Chelsea, Mass.; co-chairman, Albert Rudnickas, Producto Machine Co., Bridgeport, Conn.

3 p.m.—**Nonferrous Session:** "Manganese and Aluminum Bronze Foundry Practice," Charles V. Knobeloch, metallurgist, R. Lavin & Son Inc., Chicago. Chairman, Patrick Malloy, Scovill Mfg. Co., Waterbury, Conn.; co-chairman, Joseph Torrey, Torrey Roller Bushing Works, Bath, Me.

6:30 p.m.—**Conference Dinner.** Speaker to be announced. Chairman, Prof. Howard F. Taylor, MIT; co-chairman, Thomas I. Curtin Jr., Waltham Foundry Co.

Saturday, Oct. 15

8 a.m.—**Registration**

9 a.m.—**Ferrous and Nonferrous Session:** "Casting Defects," W. A. Hambley, Charles A. Krause Milling Co., Milwaukee. Chairman, Lewis Greenslade, Brown & Sharpe Mfg. Co., Providence, R. I.; co-chairman, Edward Chad, Standard Foundry Co., Worcester, Mass.

10:30 a.m.—**Ferrous Session:** "Some Aspects of Sand Practices for the Small Foundry," William G. Parker, General Electric Co., Schenectady, N. Y. Chairman, R. Walker, Whitin Machine Works, Whitinsville, Mass.; co-chairman, Joseph B. Stazinski, General Electric Co., Everett, Mass.

10:30 a.m.—**Nonferrous Session:** "Plaster Molding," Julius Ferrari, Gorham Mfg. Co., Providence, R. I. Chairman, Walter Carlson, Carlson Pattern Works, Springfield, Mass.; co-chairman, Elmer Brown, Rawcliff Foundry Co., Providence, R. I.

12 noon—**Lunch.**

1:45 p.m.—**Ferrous and Nonferrous Session:** "Gating and Feeding," Michael Bock II, Exomet Corp., Conneaut, O. Chairman, Romeo Lamoine, Fitchburg Foundry Inc., Fitchburg, Mass.; co-chairman, Carl Erickson, Franklin Foundry, Hyde Park, Mass.

3:45 p.m.—Conference adjournment.

ing of undesirable shape. A parting carried beyond the flask line will cause a wave in the plate that will not allow the casting flask to set solidly against the pattern.

All partings must reach the parting line of the flask within the inside limits of the flask to be used for casting. To determine where the partings should be cut, the flask used for casting is placed on the drag mold and a line drawn on the surface of the mold. This line is used later to determine where the gates must be cut and where the spacers are to be placed.

Because matchplate patterns are drawn from the sand at right angles to the flask face, patterns of angle draft must be bedded or supported in such a manner that they can be withdrawn vertically without damage to the mold.

After the drag had been rammed on the false cope, the entire mold was rolled, the false cope removed and the parting cut in the drag in the same manner as though the mold were to be used for ordinary casting. All parting surfaces were slicked smooth. Any roughness in the drag parting will be reflected as roughness in the finished plate.

To determine the exact parting line, the pattern was rapped lightly after the approximate parting had been cut, the pattern slightly withdrawn, then returned to the mold. This action will break the sand where a backdraft occurs, and the sand thus loosened can be blown from the mold and the true parting smoothed down.

After parting material had been dusted on the drag, the excess was blown from the mold surface. Because the entire mold surface is to be used as casting surface, any excess parting material which might be removed after the mold is complete would tend to cause roughness of the plate. Although such roughness may not affect the future casting, it will detract from the appearance of the matchplate.

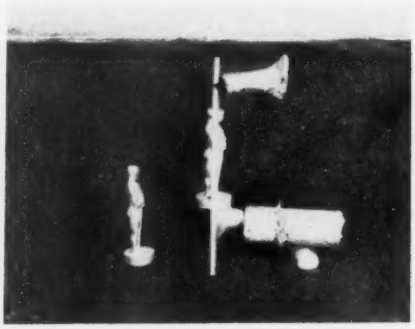

Fig. 7—View shows pattern and cast matchplate. Heavy risers are needed with cast aluminum to feed the heavy plate section

Gating of the mold was done through cores placed on the drag and located by the lines drawn on the mold surface. The placing of gate cores obviates cutting gates into the mold cavity. If the gating for the casting is to be incorporated into the plate, attention must be paid to the enlarged cross-section they create. Risers must be placed to feed the shrinkage of metal at that point.

Care should be exercised in ramming the cope with the peen. Any impression rammed into the drag will be reflected as a wave in the finished plate.

After the mold has been opened and the patterns withdrawn, gates and runner bars, of the same type as those to be used in casting, can be cut into the mold. These should be slicked smooth to avoid excessive finishing work after the plate has been cast.

Spacer bars are placed on the drag, located by the lines drawn there

Pouring the water-cooled electrode holder shown in the picture below at City Pattern Foundry and Machine Co.

Cleaning a water-cooled electrode holder to smooth out parting lines, gate and riser contacts, etc.

A typical foundry specializing in beryllium copper

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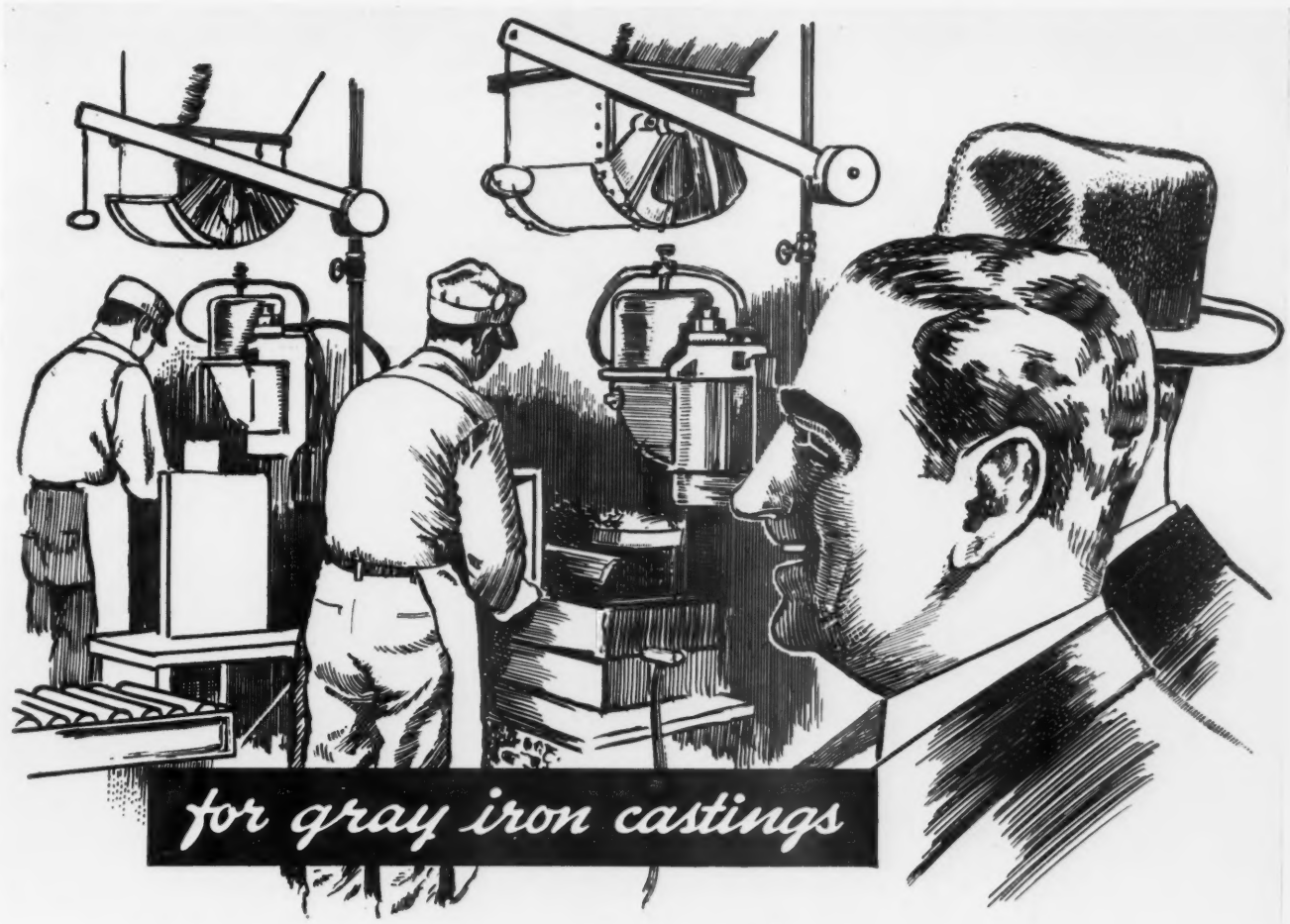

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UNITED ARTISTS BUILDING, DETROIT, MICHIGAN

when the parting was cut, and the mold is closed. The bars extend the full length of the flask. They serve to retain the metal and to determine the size and shape of the matchplate. If the spacers used for small plates are too thick, the possibility of shift is increased. For small plates, the spacers should be 5/16 to ⅜ inch in thickness, depending on plate area.

Small plates can be poured in green sand molds, but the finish of larger plates will be enhanced if the mold is skin-dried before it is poured. Molds should be inclined to a 15-degree angle, with the sprue at the lowest point. To avoid metal penetration of the sand, pouring should be done with metal as cool as possible.

On the mold for the "Oscar" pattern, additional height was added to the riser by ramming a riser cup. After the mold had filled and the gate had frozen, additional metal was fed into the riser. Because the heaviest section of the plate is usually in the center, it is not possible to side riser the casting, and top risers are the only means of feeding the shrinkage of the matchplate. Because aluminum is a light metal, high risers are necessary to provide static pressure.

After gates and risers have been removed, very little finishing of the matchplate should be necessary. Necessary finishing can be done with Swiss pattern files and a file ground to a scraper blade. After a sample has been cast, any fins on the casting can be corrected by filing the matchplate in the places where the fins have developed.

If flat plates are needed on which to mount loose flatback, or split patterns, they can be made by the same method: Placing spacer bars between the cope and drag before closing the mold. Ramming both cope and drag on a smooth, level surface, placing the spacer and pouring into the cavity provided by the spacer will produce flat plates of the correct shape and size.

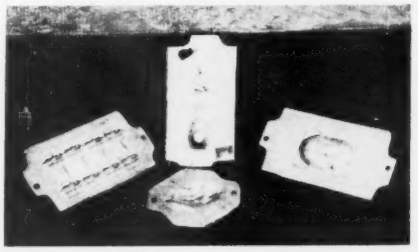

Fig. 8—Matchplates made by the method described by the author

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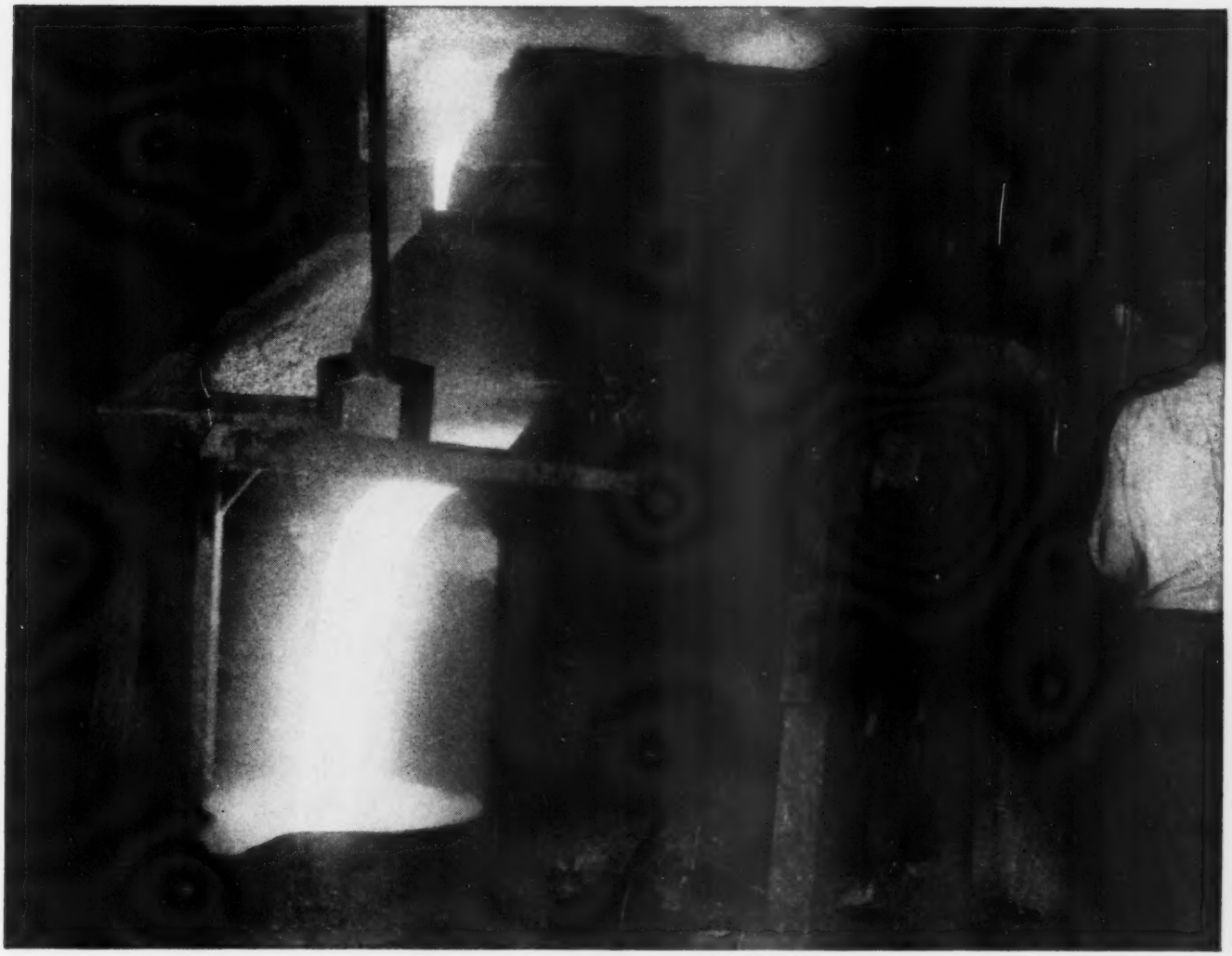
Foundry Equipment Makers To Meet In Mid-October

A discussion of "Foundry Products in Relation to the Automotive Industry" by Frank X. Bujold, manager of foundries, Ford Motor Co., Dearborn, Mich., will be a feature of the 37th annual meeting of the Foundry Equipment Manufacturers Association. The event will be held at the Greenbrier Hotel, White Sulphur Springs, W. Va., Oct. 13-15.

Meetings on the first day will center on topics of interest to the various product groups comprising the major components of foundry equipment. These include blast cleaning and tumbling, dust and fume control, flasks and accessories, material handling and processing and molding and coremaking machines.

In the general business sessions, open discussions will be held on problems affecting the industry, business trends in the economy and the rate of activity in the foundry equipment industry. The FEMA statistical program will be analyzed and interpreted, and the operations of the Washington office will be reviewed.



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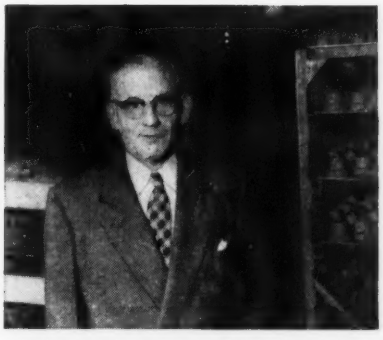

SURROUNDED BY CORES stands H. Sleicher, Treasurer in Charge of Sales. Having just switched to Cities Service No. 62 Core Oil, he reports it dries 20% faster, increases production, lowers costs.

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Man to Man

By RALPH L. LEE

Lee Hobby Foundry Gimmicks

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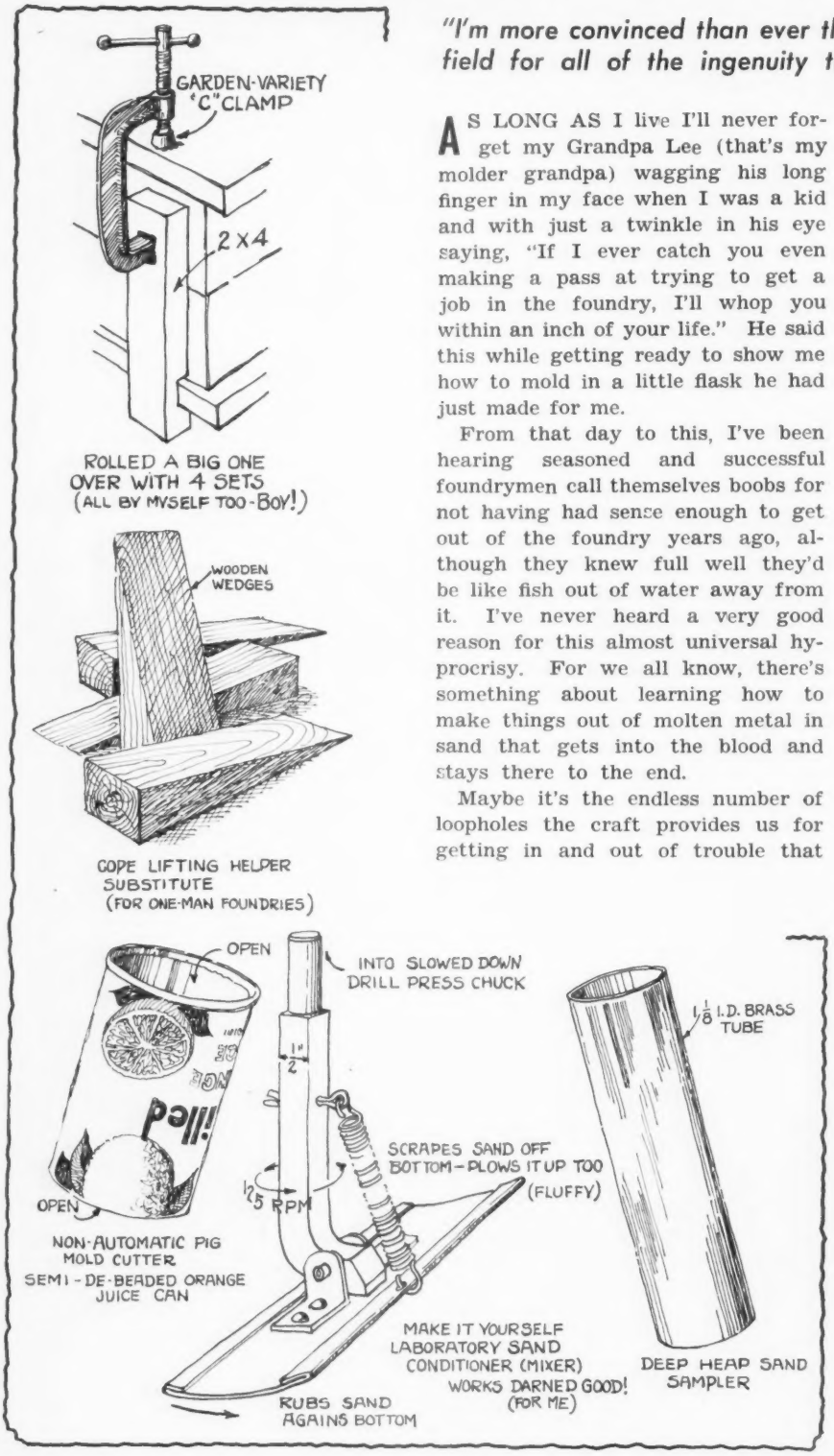

GARDEN-VARIETY "C" CLAMP
2 x 4
ROLLED A BIG ONE OVER WITH 4 SETS (ALL BY MYSELF TOO-BOY!)
WOODEN WEDGES
COPE LIFTING HELPER SUBSTITUTE (FOR ONE-MAN FOUNDRIES)
OPEN
INTO SLOWED DOWN DRILL PRESS CHUCK
1 1/2"
SCRAPES SAND OFF BOTTOM-PLOWS IT UP TOO (FLUFFY)
1/25 RPM
OPEN
NON-AUTOMATIC PIG MOLD CUTTER
SEMI-DE-BEADED ORANGE JUICE CAN
MAKE IT YOURSELF LABORATORY SAND CONDITIONER (MIXER)
WORKS DARNED GOOD! (FOR ME)
RUBS SAND AGAINS BOTTOM
1 1/8 I.D. BRASS TUBE
DEEP HEAP SAND SAMPLER

Sketches illustrate a number of Lee Hobby Foundry gimmicks, including such items as a C-clamp for rolling over flasks, wooden wedges for lifting heavy copes, a pig mold cutter, a homemade sand conditioner and a sand sampler

AS LONG AS I live I'll never forget my Grandpa Lee (that's my molder grandpa) wagging his long finger in my face when I was a kid and with just a twinkle in his eye saying, "If I ever catch you even making a pass at trying to get a job in the foundry, I'll whop you within an inch of your life." He said this while getting ready to show me how to mold in a little flask he had just made for me.

From that day to this, I've been hearing seasoned and successful foundrymen call themselves boobs for not having had sense enough to get out of the foundry years ago, although they knew full well they'd be like fish out of water away from it. I've never heard a very good reason for this almost universal hyprocrisy. For we all know, there's something about learning how to make things out of molten metal in sand that gets into the blood and stays there to the end.

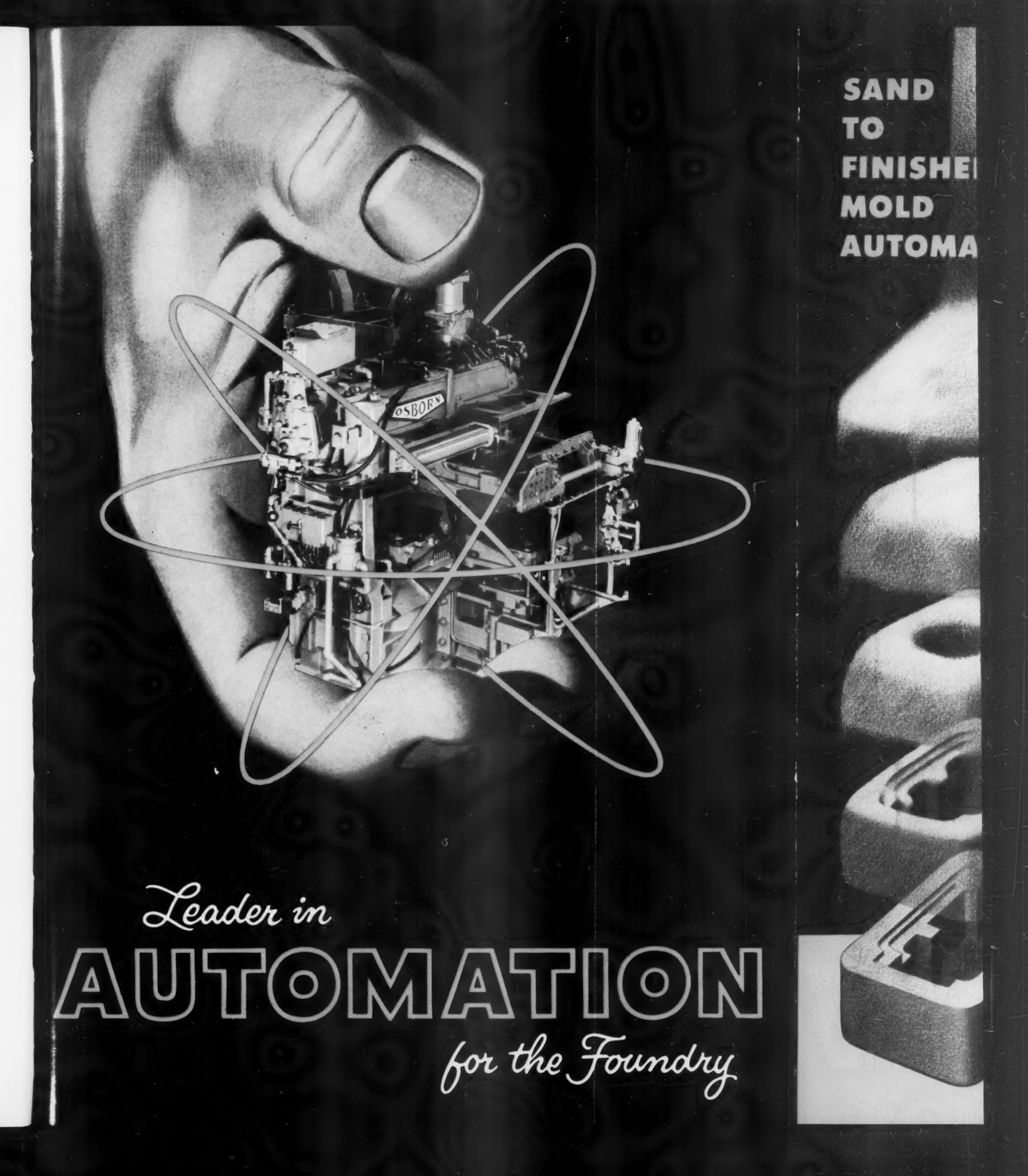
Maybe it's the endless number of loopholes the craft provides us for getting in and out of trouble that makes it so much a challenging adventure. Then there's the bang you get out of pulling rabbits out of hats —doing what on the face of it and at a time seems literally impossible. Nothing is ever exactly the same, nothing will stay put, and there seem to be more combinations of circumstances to deal with than in almost any other business you can think of.

But the more I visit foundries and foundrymen, the more it begins to look as though one of the things that keep foundrymen wedded to the craft is a collection of gimmicks they have tucked up their sleeves—tried and proven gimmicks which they know from experience will help them do the trick in the face of seeming stone walls, straitjackets, dilemmas and emergencies of one kind and another. A gimmick is defined as "any small device used secretly by a magician in performing a trick."

John Kenny, a retired foundry owner and a regular visitor to the Lee Hobby Foundry, I am happy to say, has more gimmicks up his sleeve than any other foundryman I have ever met. He's made just about every kind of a casting there is, from a few ounces to tons and tons.

On his last visit, he found me lower than the belt buckle of a garter snake. A job had just been taken away from me. Marshall Fredericks, nationally known sculptor, had given me a beautiful plaster figure to cast in bronze. After building a special flask, a great big one, for me at least, since it held 350 lb of sand, I made five tries with a rugged parting line each time and with no luck. Having no helper, I was trying to lift the cope with a chain block and two spirit levels. (Mother refuses to overstep organizational lines.)

John Kenny (if he had only come sooner!) told me about wedges. I have sketched their portraits under the title "cope lifting helper substitute." According to John, you lift one corner of the cope at a time, just a wee bit, shoving in the wedge to hold the lift gained. Around you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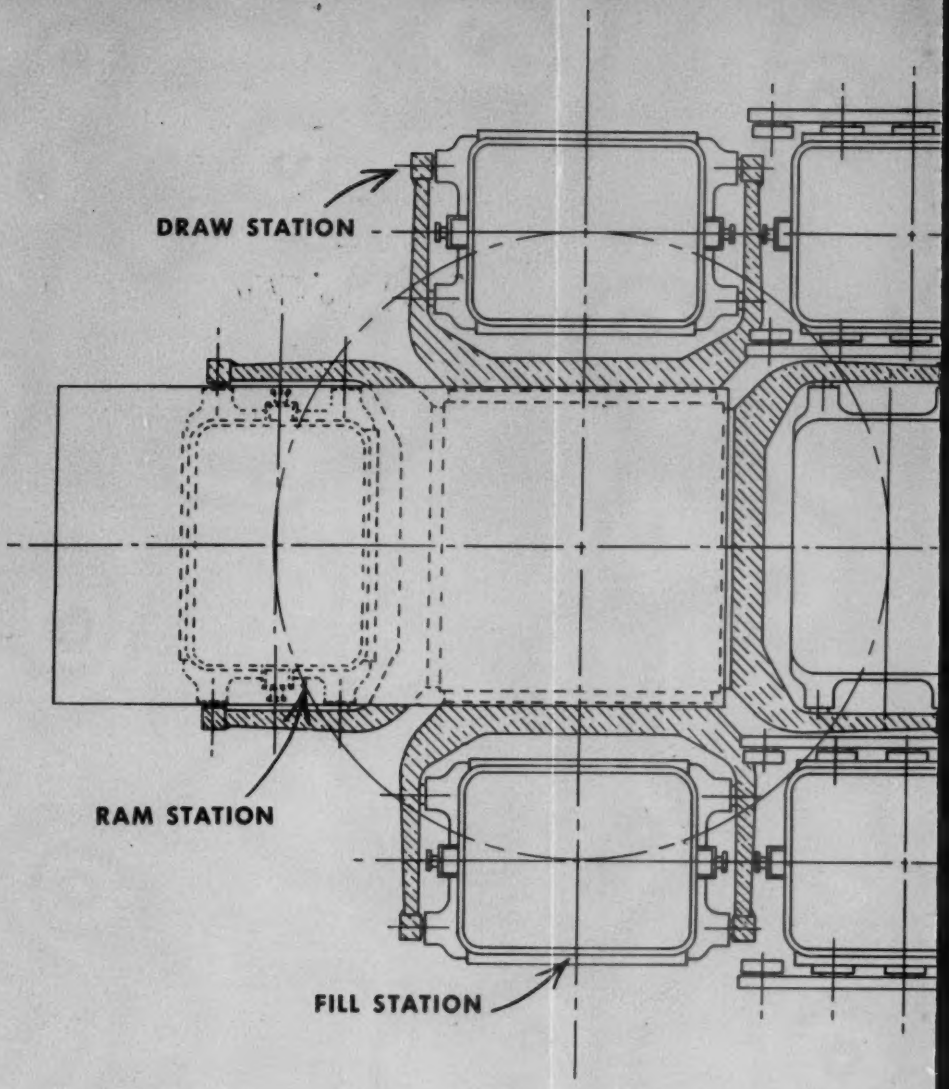

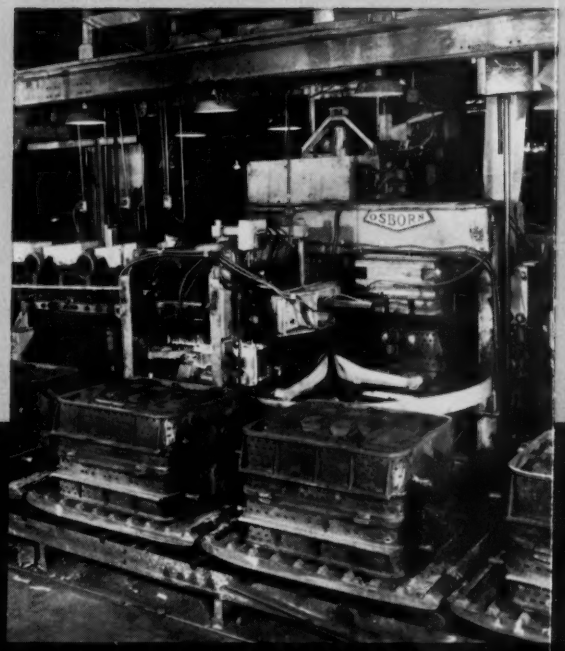

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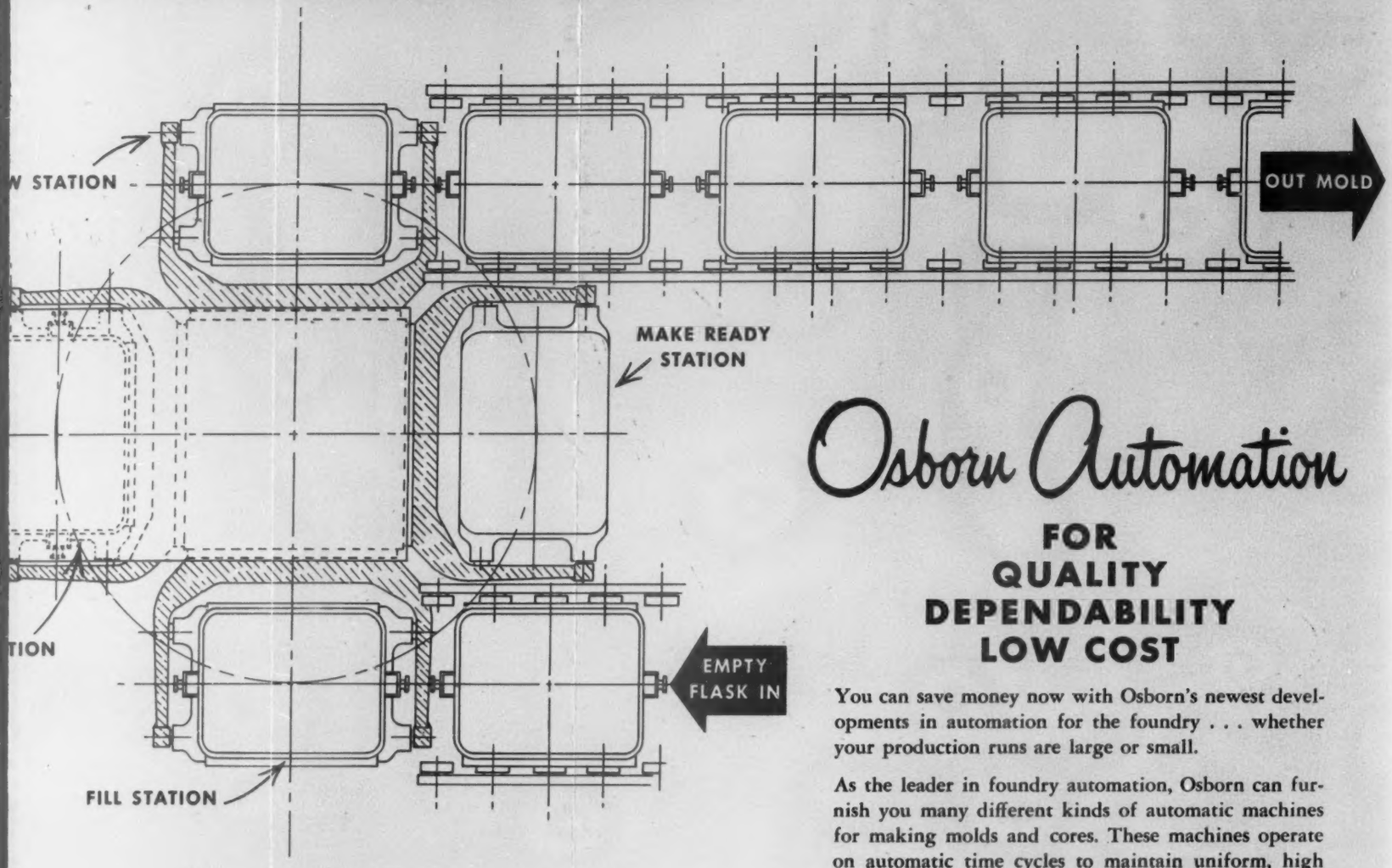

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Leader in Automation for the Foundry

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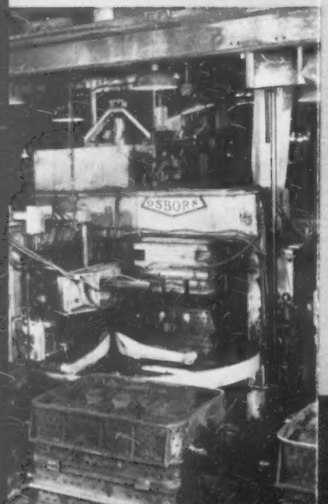
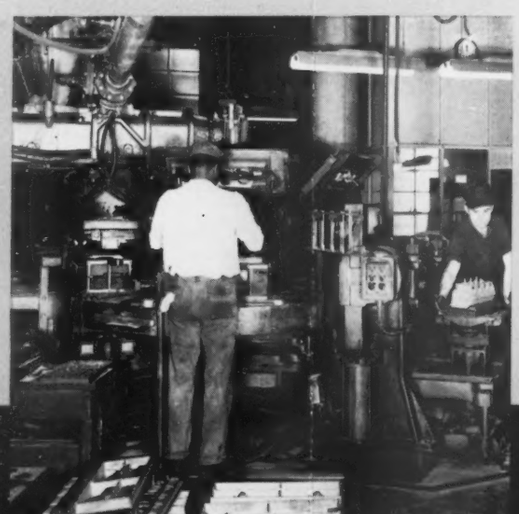


DING. Finished half molds... at more per hour.



AUTOMATIC CORE BLOWING. 5 different kinds of cores produced at one time... at rates up to 360 blown cores per hour.

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MOLDING MACHINES CORE BLOWERS

INDUSTRIAL BRUSHES

go from corner to corner until you can trust the hoist. I had never heard of such a thing. He also showed me how to chamfer (angle) the guide pins specially for a one-man operator.

I felt highly complimented when John nodded his head over one of my gimmicks. John isn't what you'd call demonstrative! I had to roll my big flask over and had nary a clamp big enough. So I wiggled my way out of this dilemma with some pieces of 2 x 4 planking and some pattern shop clamps. A portrait of this streak of genius I have sketched with loving care.

Having gotten into the mood for gimmicks and drawing, I now wish to present another work of art entitled "nonautomatic pig mold cutter." Almost every foundryman who visits us approves this silly little old device for pigging left over metal. Before my invention I had made a pattern for a pig mold and cast it out of iron—then a set of patterns on a board, but I found them too much trouble to use. With some sand always handy and several sizes of topless and bottomless cans within reach I almost can make my pig molds with one hand on the ladle handle. This is elementary, "dear Watson," but mighty, mighty handy.

Having gone plumb to seed on gimmicks, I now present my "deep heap sand sampler." Since I have read the AFS handbok on sand, I have become practically reverent toward the prescribed ritual for securing sand samples which accurately represent the heap or system. In my recent researches, I use two-quart mason jars for prepared specimens. They are splendid for holding moisture as is. But even in such close quarters and in spite of careful preparation, there are differences from top to bottom, particularly when you are doing split-hair work. Mimicking the geologist's test boring technique, I shove my brass tube down into the sample or heap and with a very light ram or two with a wooden dowel rod bring out a specimen which I have found to be truly representative.

Finally, my last work of art represents a pet gimmick for mixing sand specimens with the drill press. With Mother (Mrs. Lee, chairman of the board and also treasurer) holding the purse strings at a strangulation tension, those cute little laboratory sand mixers are entirely out of reach. So ingenuity came to the rescue in a Goldberg vein. I hope my sketch is self-explanatory.

The sand is held in an old family

Even workers wearing glasses say they "never had it so COMFORTABLE!"

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Replaceable lenses cut cost—no need to replace entire goggle. Lens held firmly in molded groove.

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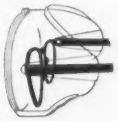
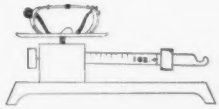
Channeled sides of frame give comfortable clearance over spectacle temples.



Light in weight
Can be worn all day without fatigue—encourage continuous protection.



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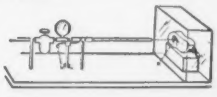
Pass recognized tests for impact protection as listed in Federal Specification GGG-G-531a, Goggles and Spectacles, all plastic, industrial.



Workers who wear prescription glasses—even big plastic frames—are mighty glad to get the extra roominess provided by NO. 90A MONOGOGGLES. Its greater clearance results in utmost comfort.

Exclusive Willson features described at left encourage workers to wear these sturdy MonoGoggles. Note how large flat .060 plastic lens provides "picture-window" scope of vision—how the deep, transparent light green frame admits side vision while eliminating glare.

Ask your Willson distributor to demonstrate its unique protection against light impact hazards like those found in spot welding, buffing, woodworking and chemical handling. You have a choice of ventilated or non-ventilated frames, clear or green plastic lenses. Bulletin mailed promptly on request.

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Pangborn
CONTROLS DUST

heirloom, an aluminum soup kettle, and mixed against a disk of masonite in the bottom. It's held to the drill press table with two simple wooden clamps. A wooden, jig-sawed doughnut over the biggest diameter of the driven step cone pulley reduces the spindle speed.

We mix 4 pounds of sand in a hurry, and it's nice and fluffy too. Later I'm going to set the mixer up on its own out where it belongs, with the other sand stuff. I don't like sand dragged into the pattern shop.

Yes! I'm more convinced than ever that the foundry offers a wide open field for all of the ingenuity anyone cares to invest, even for the expression of personal preferences and downright peculiarities. In spite of the progress we are making toward the standardization of foundry practices and equipment, I don't think the day will ever come when the opportunity to gather our own private and personal gimmicks will be crowded out. To my way of thinking the foundry will always be as much a craft as it is a science. I like it very much.

Walworth Co. Establishes New Research Laboratory

To speed development of valves and fittings for use in nuclear power systems, Walworth Co., 113-year-old manufacturer of valves and fittings, is establishing a new Research and Development Division at Boston.

Objectives include: 1. Design and development of valves for use in nuclear reactors, reactor components and auxiliary equipment. 2. Development and design of automatically controlled valves for applications in the general field of automation. 3. Evaluation and improvement of existing Walworth product processes.

The new laboratory is expected to be in full operation by October. The company plans then to add to its research staff as consulants several outstanding experts in the fields of physical and process metallurgy, nuclear engineering and design of automatic and remote control devices applied to valves. Head of the new program is Dr. Forest C. Monkman Jr., a specialist in metals testing and research. A graduate of Massachusetts Institute of Technology, he has been manager of the New England Materials Laboratory of Boston, where he had responsibility for metals development and testing programs assigned by industrial firms and the Atomic Energy Commission Laboratories at Oak Ridge, Tenn.

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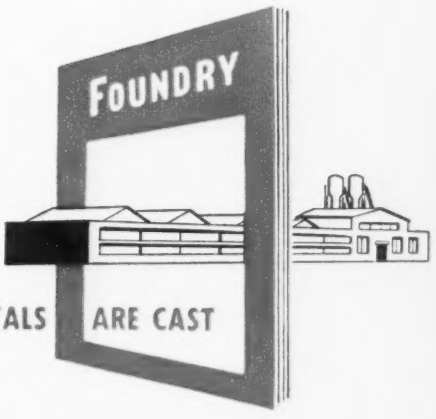

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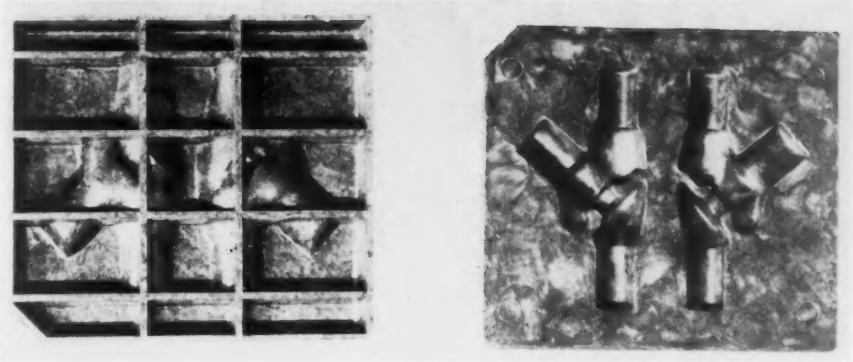


Fig. 1—View at the left illustrates perimeter reinforcing rib. At the right, view shows cavities and surface which matches the corebox

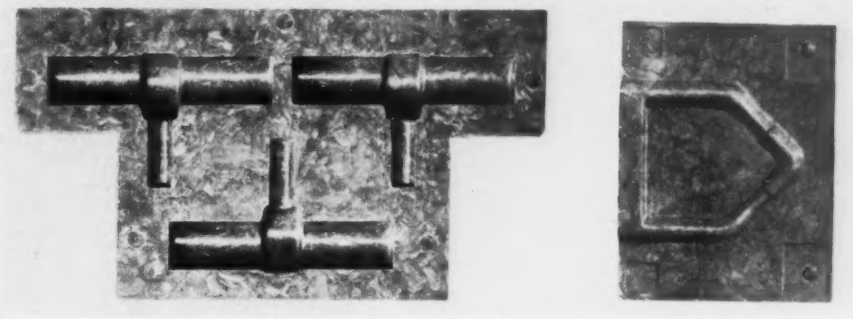


Fig. 2—Showing a blow-in type drier at left, transfer type at right

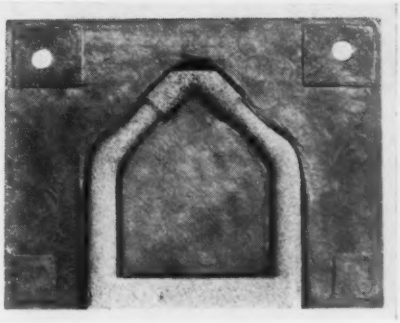


Fig. 3—This shows the transfer type drier with sand core

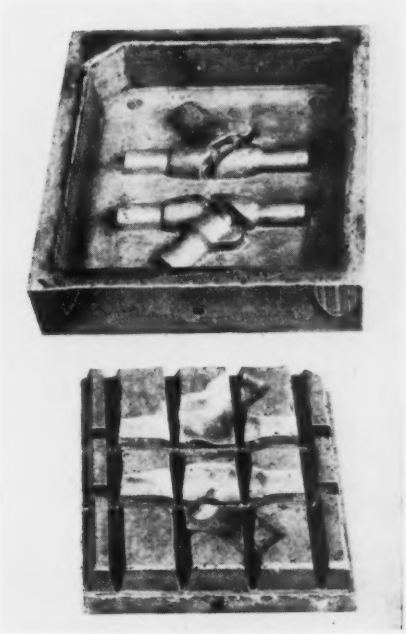


Fig. 4—Top view illustrates cavity of mold and contour of core. Bottom view shows force plug and its reinforcing ribs

Dual Purpose

PLASTIC CORE DRIERS

By DON W. SCHMANSKI
Development Chemist
Fiberite Corp.
Winona, Minn.

THE Fiberite Corp., Winona, Minn., has recently developed a high-impact, heat-resistant, thermosetting molding compound suitable for all core drier applications. Driers made from this material can be used in both high-frequency dielectric ovens and in hot air type ovens. Designated as Fiberite 4030, the product is made of a special type of phenolic resin reinforced with fiber glass. Its general specifications are:

1. Low unit cost for relatively high volume drier requirements. It can be molded at very low pressures in inexpensive cast aluminum molds.
2. High mechanical strength to withstand abuse in foundry.
3. Ability to accurately reproduce mold dimensions and finish.
4. Resistance to abrasion when used as one-half of corebox in blow-in type driers.
5. Exceptional dimensional stability during heating and cooling.
6. Specific electrical properties required for use in dielectric ovens. Temperature of the drier in a dielectric oven will raise just enough to prevent any water condensate forming under the sand core.

A finished core drier must have these design features:

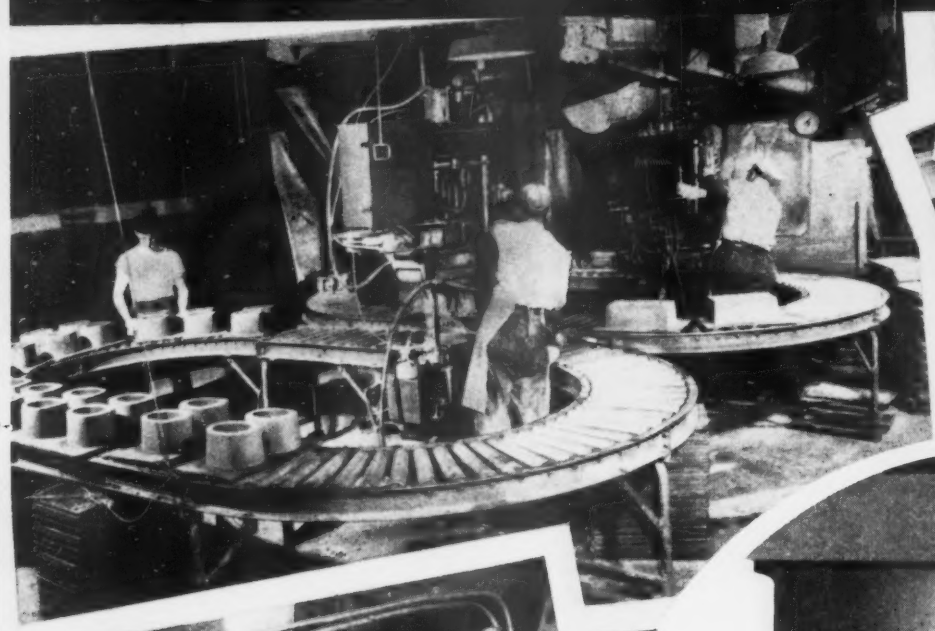
1. It must be rectangular in shape and of a size suitable for all types of core baking ovens.
2. It must have a reinforcing rib around the perimeter and cross ribs under each cavity. These ribs are tapered to give draft for ease in molding. It is also very important that the cross-sectional thickness of the drier be constant. This also increases the dimensional stability of the drier.
3. On a multiple cavity drier, the cavity layout must be symmetrically proportioned.
4. An important factor for blow-in type driers is that the surface of the drier must be matched with the corebox and be flat and smooth.

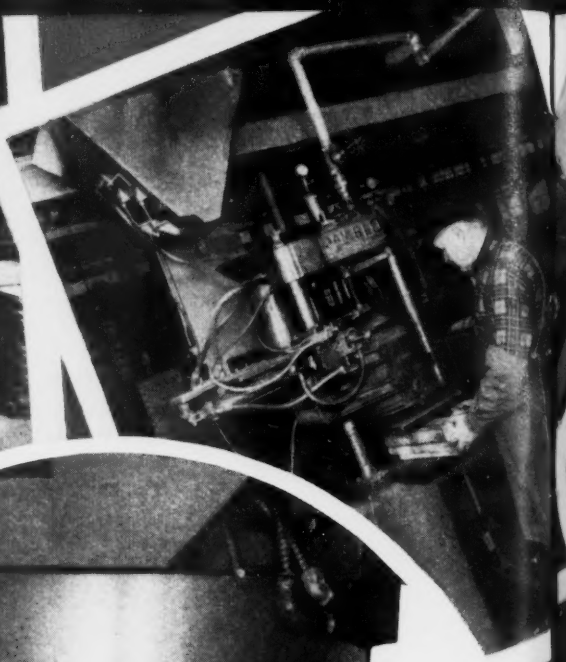
Fig. 2 shows a typical blow-in drier (left) and a transfer type drier. This transfer type drier is not used as one half of corebox, but merely as a drier to which the core is transferred.

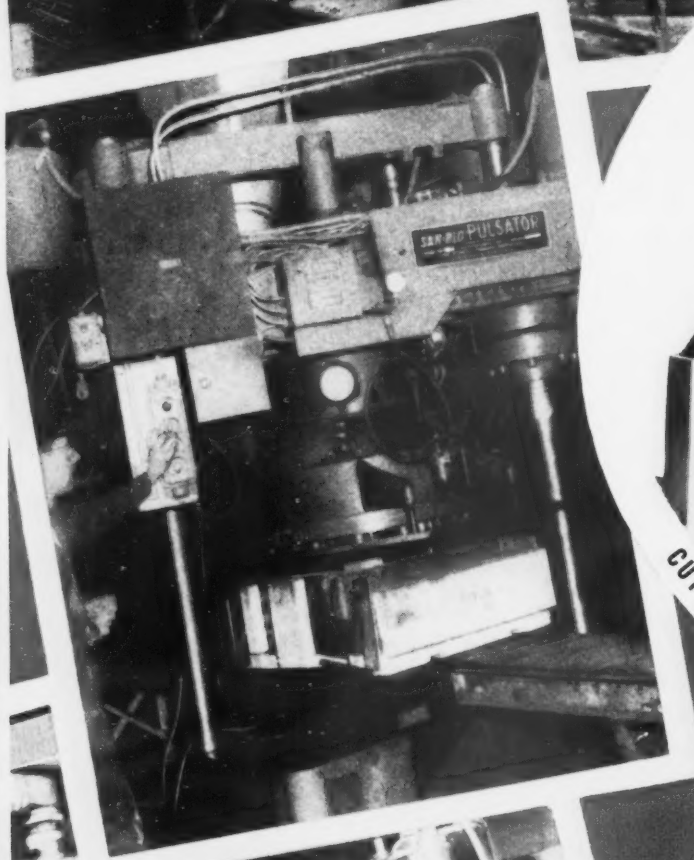
Molds used in molding the driers are made simply and inexpensively. Basic metals used for these molds are pressure-cast aluminum, iron, kirksite, bronze and beryllium alloys. Aluminum is often prefered, being light weight and having good thermal conductivity.

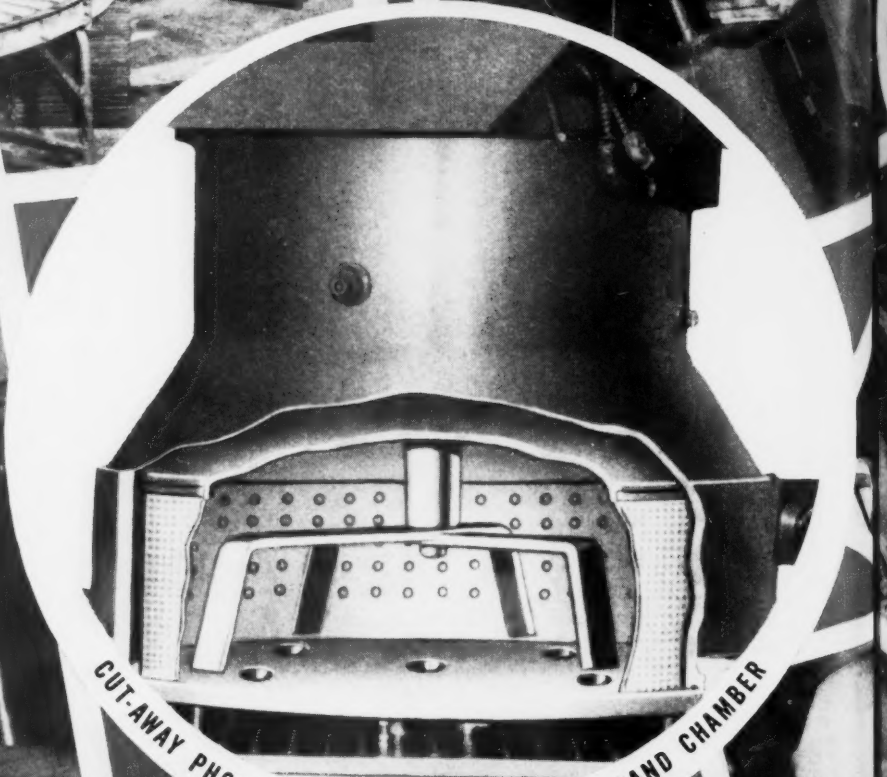
The mold is usually of the box type as shown in Fig. 4. The force plug

1 out of 3

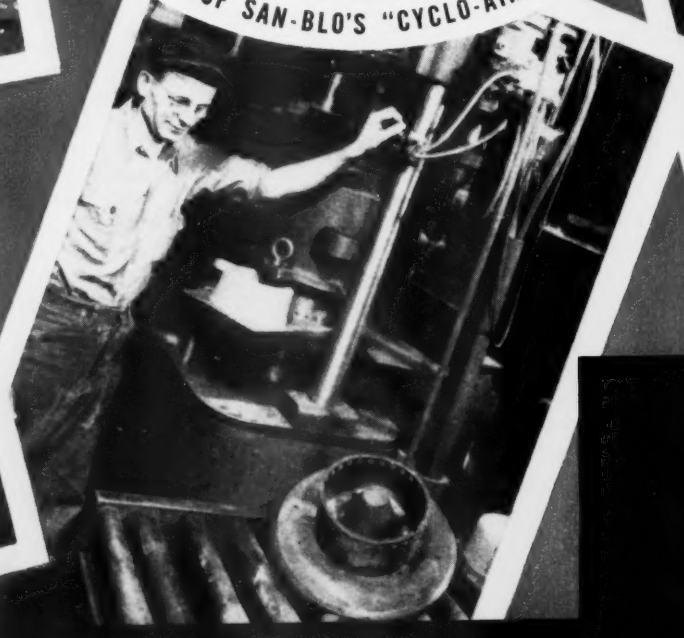




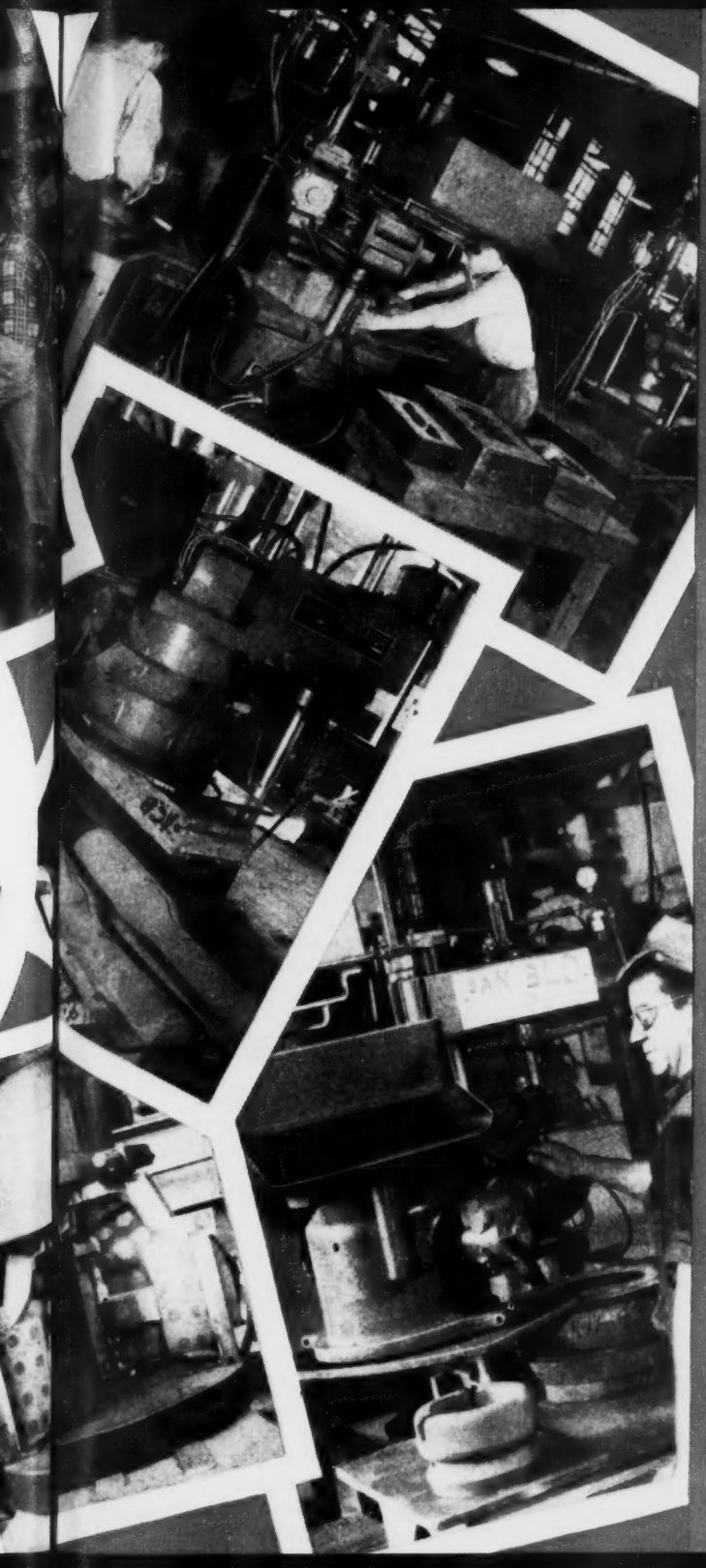




CUT-AWAY PHOTO OF SAN-BLO'S "CYCLO-AIR" SAND CHAMBER



STEEL FOUNDRIES



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But, yours doesn't have to be a steel foundry to take advantage of the SAN-BLO's many exclusive features. No matter what your core blowing problems—chances are the SAN-BLO can solve them. Why not investigate? Write the SAN-BLO Division for full information.

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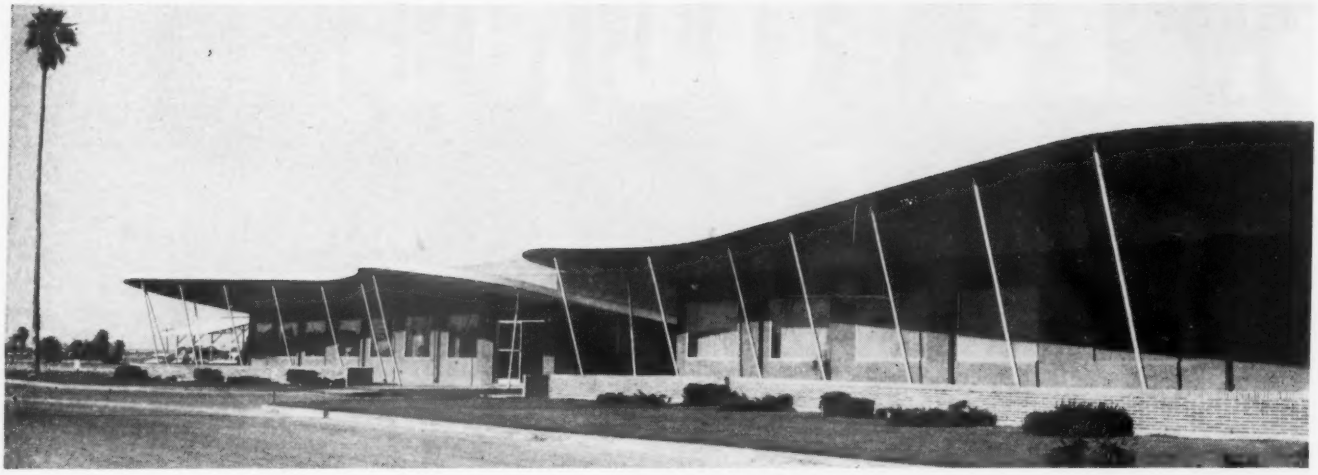

Entrance to new plant of Capitol Foundry Division, National Malleable & Steel Castings Co., near Phoenix

Arizona Site of One of Country's

NEWEST FOUNDRIES

MODERN architecture that is typical of the Southwest—though perhaps not of foundries—is incorporated in the attractive main entrance and offices shown here of one of the country's newest and most modern foundries. The plant is that of the National Malleable & Steel Castings Co., known as the Capitol Foundry Division. It is located near Tempe, Ariz., a few miles from Phoenix.

The foundry has two main departments. One is for the production of cast steel grinding mill balls used extensively in the mining industry; miscellaneous carbon and alloy steel, Ni-Hard and gray iron castings are made in another area. The ball foundry has been in production since early this year. Installation and arrangement of equipment for producing other castings is nearing completion, and operations are increasing each month.

The plant is modern in all respects, well lighted and airy. Arizona's mild-to-hot weather permits elimination of side walls from the foundry proper. Layout of the plant is somewhat unusual in that a 137 x 148-ft service building is located in approximately the center of the foundry. This building, an enclosed structure, houses laboratories, offices, storerooms and pattern, carpenter, electrical, machine and pipefitters shops. Its location makes it convenient to all foundry departments.

Melting units consist of four direct-arc electric furnaces for melting both steel and iron. Two are 7-ton capacity, the others 9 and 10 tons. Molding equipment for making miscellaneous castings includes a sandslinger, which rams molds on a turntable, a squeezer line of four machines and two pairs of automatic cope and drag jolt-squeeze machines. Both pallet and car type conveyors are used to handle molds. Complete heat treating and quenching facilities are provided.

The foundry can produce castings up to 1 ton in weight and has a monthly capacity of about 750 tons. The plant is laid out so that this capacity can be doubled with little additional construction.

(below) should contain the reinforcing ribs. The cavity of the mold provides for the surface of the drier in which the contour of the sand core is molded. This cavity must be designed to allow adequate loading space for material. The bulk factor is high due to the fiber glass used for reinforcing. On this particular mold the knock-out pins are located in the cavity. The mold is inverted and the pins are lightly tapped to eject the drier. If the mold is mounted in a press, the knock-out pins are usually in the force or punch. In this case, the mold is designed so that the drier will hang to the punch which is withdrawn from the cavity at the end of curing cycle. The pins then push drier off of the punch.

Fiberite 4030 can be molded under pressure as low as 200 psi which means that the large and expensive presses normally used for high-impact phenolics are not required. This material should be molded at 300° F for best results. The curing cycle is dependent on thickness of sections. Three minutes is a normal cure for ⅛-in. sections, and the time required for others varies accordingly.

For driers to be used in hot air ovens, a post cure is necessary to achieve maximum heat resistance. For driers to be used only for dielectric ovens, this post cure is not required.

The author thanks John David, Paul Bury, and Paul Fina, executive members of the Fiberite Corp. for their assistance in the presentation of this article.

Prints Booklet on Band Saws

Printed copies of Simplified Practice Recommendation R214-55, Metal-Cutting Band Saws (Hard Edge, Flexible Back), originally issued in 1945, now are available from the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce. It covers types and sizes of hard-edged, flexible-backed, metal-cutting band saws recommended for regular stock purposes. Copies are 5 cents each from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or from any field office of the Department of Commerce. A 25 per cent discount will be allowed on orders for 100 or more copies mailed to a single address.

no matter which way you move JEFFREY belongs in the picture

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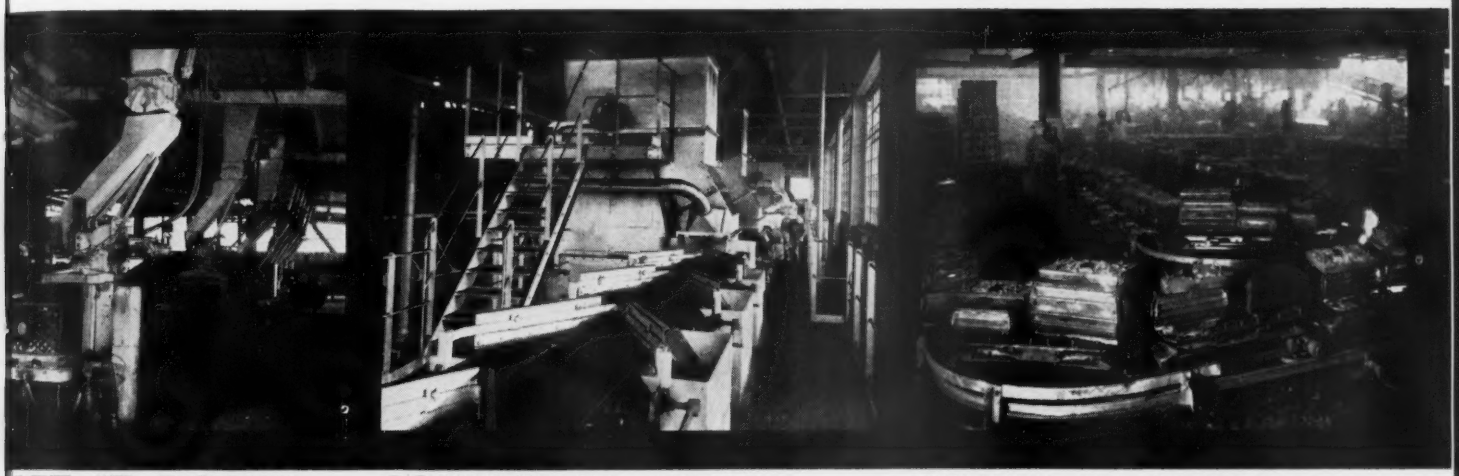
APRON CASTINGS CONVEYOR



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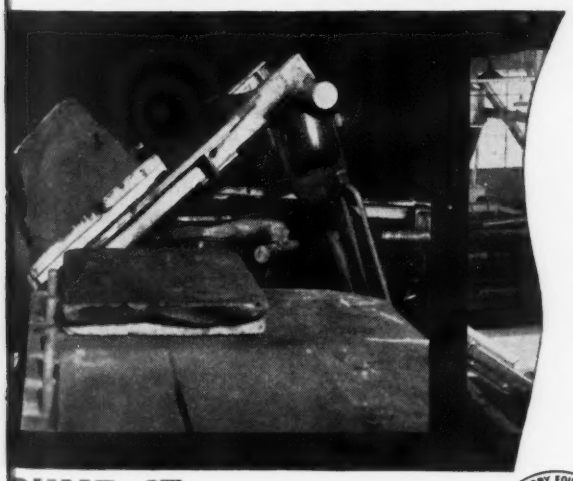

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Detroit—Automotive gas turbine engines are assuming front position in the planning and thinking of automotive company and alloy supplier management. Proximity of the turbine to general use in automobiles is indicated by the fact that alloy suppliers are holding top level meetings with principal automotive companies, individually, to determine what their needs will be. Alloy suppliers also are holding meetings within their own organizations to plan production so that they will not be caught with their stock piles down on materials needed for turbine engine parts.

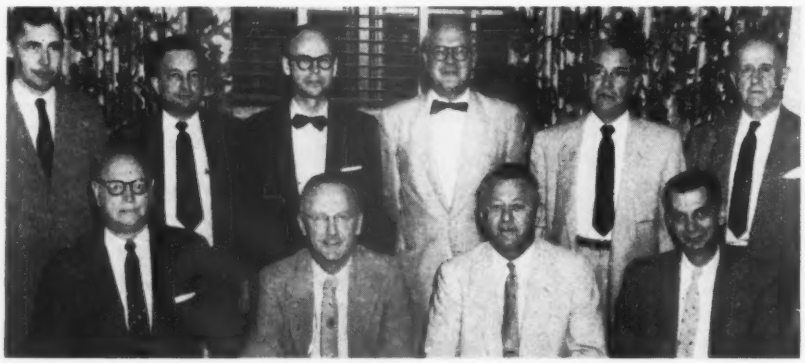
Automotive companies themselves are in an "on-the-fence" position. All the major ones and at least one of the independents have turbine engines in various stages of development. The question of who will introduce the engine first has them all on edge. Some are closer to production models than others.

The whole situation is influencing plans for next year's reciprocating engines. As an example, the use of aluminum in recent models has been increasing, and use for the 1957 model was to be accelerated. In this respect at least one company is in a quandary. It faces current meetings with aluminum suppliers to determine tonnage quotas. Yet it doesn't know how far to go in making design changes in parts which are to be switched to aluminum from other metals, because by the time the parts are needed there may be a hectic scramble to get the turbine in production. And there won't be much aluminum in turbine engines.

Turbine thinking also has its effect on needed expansion of automotive gray iron foundries. One shop has realized the need for expansion for two years but is continually postponing it, pending turbine engine development. Another foundry put off expanding as long as it could but finally embarked on a program about a year ago because of the press of current model competition.

As it looks now, the tonnage of gray iron castings in turbines will be low. As one automotive man high in management put it, "All foundry practice common in piston engine production will be outdated when the turbine engine comes. New foundry developments and much ingenuity on the part of foundrymen are needed to furnish many of the parts, particularly rotating parts, for turbines."

General consensus among automotive men is that foundries at this moment can not produce castings of high enough quality cheaply enough to meet the needs of production turbines. Experience to date indicates extensive use will be made of stampings, forgings, machined parts and possibly some cast-weld components. The metals will be those developed for elevated-temperature conditions—high-nickel and high-chrome alloys.



FOUNDRY APPRENTICES: A foundry training meeting was held in Washington, on July 20, by the Bureau of Apprenticeship of the U. S. Department of Labor. These representatives of government and industry were present to discuss an apprenticeship program for the foundry industry. Seated, left to right: Cal C. Chambers, Texas Foundries Inc.; Fred G. Sefing, International Nickel Co.; W. J. Klayer, Aluminum Industries Inc.; and B. C. Yearley, National Malleable & Steel Castings Co. Standing, left to right: John S. McCauley, Bureau of Apprenticeship; W. C. Christensen, Bureau of Apprenticeship; Herbert F. Scobie, *Modern Castings;* William J. Moore, Bureau of Apprenticeship; Frank G. Steinebach, FOUNDRY, and Richard Brown, Bureau of Apprenticeship

Chicago—The lake front here south of Soldier Field—the site of the Century of Progress Exposition in 1933-34—took on a new look during August. On an area of one million sq ft, General Motors Corp. was setting up its Powerama, or World's Fair of Power, which will be open to the public from Aug. 31 to Sept. 25.

Purpose of the event is to portray the dramatic contributions of diesel and aircraft power to America's industrial economy and to celebrate the production this year of GMC's 100 millionth diesel horsepower.

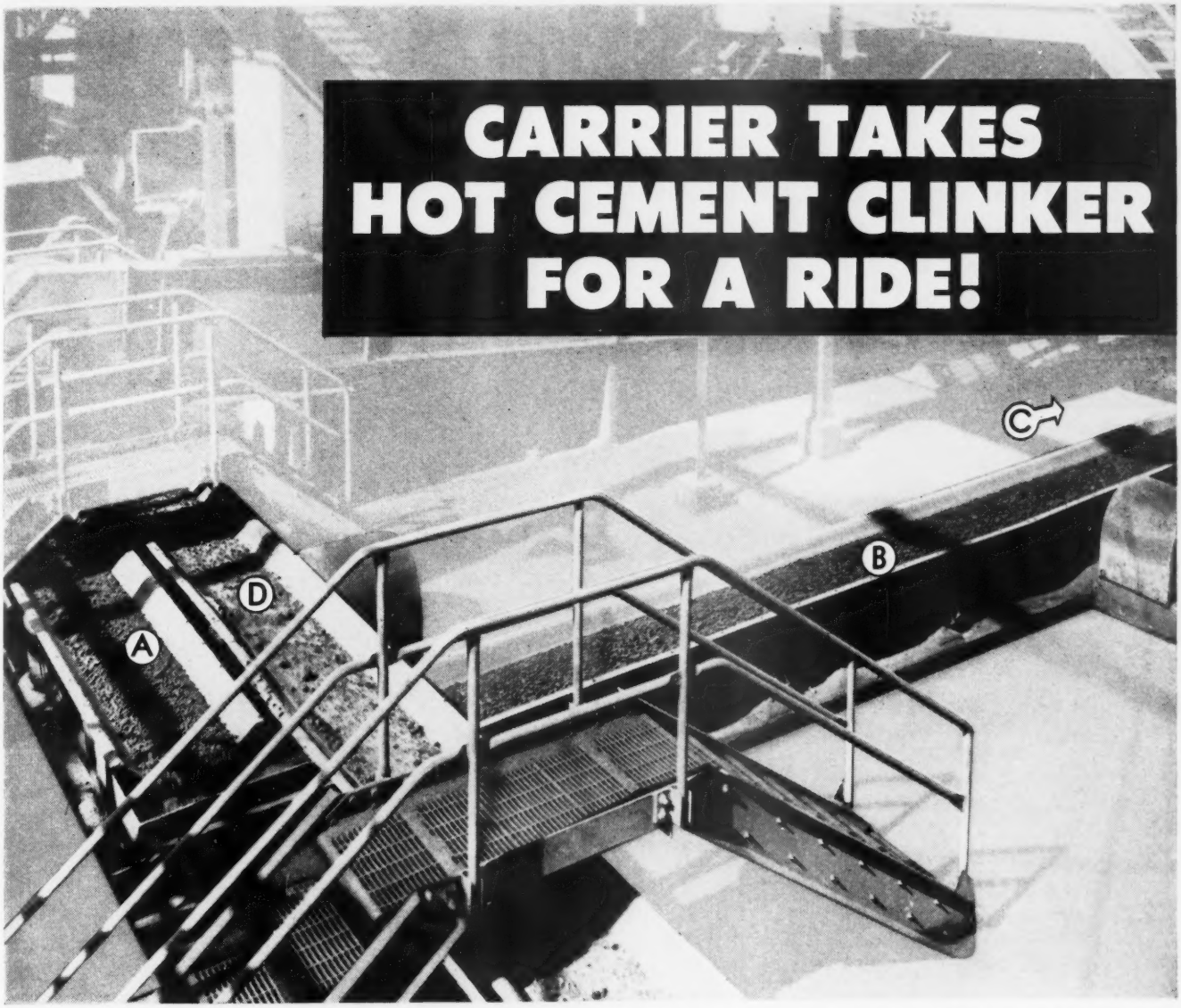
To the layman, Powerama will be just what the name implies—a display of power—but to the foundryman, it will emphasize the prominent part which castings serve in this age of power. There will be more than 150 exhibits and in virtually every one castings will be found.

General Motors divisions with exhibits at Powerama will include Allison, Cleveland Diesel, Detroit Diesel, Diesel Equipment, Electro-Motive, Euclid, Fabricast, Frigidaire and GMC Truck & Coach.

* * *

In late July, foundry coke prices were increased $1.00 to $1.25 a ton in the midwest area. New f.o.b. oven prices are $25.75 at Chicago, $25.50 at Indianapolis and Terre Haute and $26.25 at Milwaukee. Like

CARRIER TAKES HOT CEMENT CLINKER FOR A RIDE!



Carrier Conveyor "A" takes the clinker from coolers and feeds it at right angles onto the first of two other Carrier Conveyors "B" ("C" not shown) for delivery to a bucket elevator and storage.

Carrier Conveyor "D" also takes the clinker from coolers, but conveys it directly to a different storage pit.
All four conveyors have 18" flared pans and 5HP drives, with a total length of 233'.

THAT'S hot cement clinker you see on those four Carrier Natural-Frequency Conveyors. It's being taken for a ride from coolers to two different storage pits. . . .

400° F. clinker is extremely abrasive — extremely tough to handle. Yet the Carrier Natural-Frequency Conveyors move it at the rate of 60 tons per hour with *a minimum of spillage, maintenance and downtime!*

Cement-industry applications are just one of many uses for Natural-Frequency Conveyors. Others include bulk chemicals, castings, ores, mill scale and slag, food products, machine turnings — all of which are now being conveyed and processed with spectacular success by Carrier Natural-Frequency vibrating equipment. Write for Bulletin 111. Carrier Conveyor Corporation, 239 North Jackson Street, Louisville 2, Kentucky.

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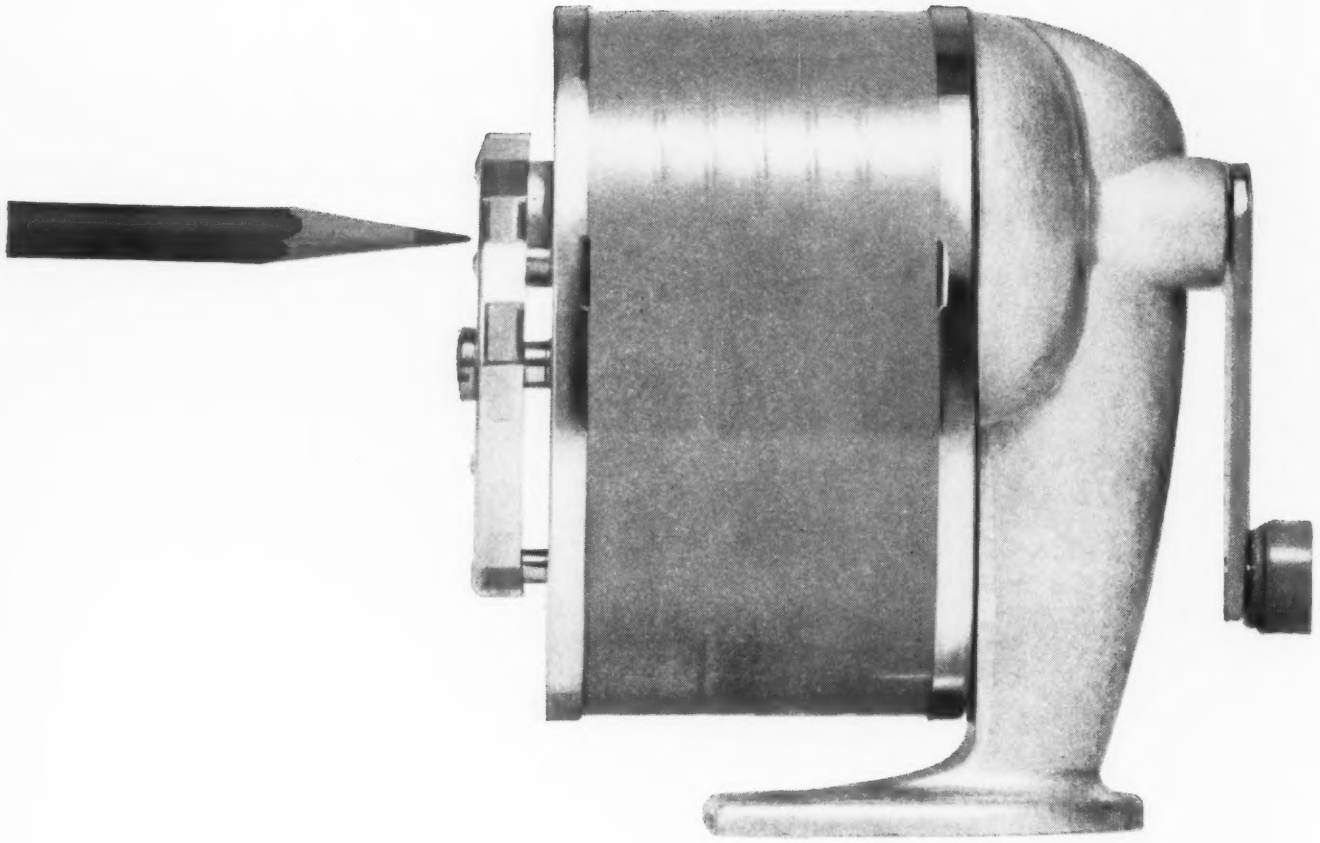
~~NATURAL-FREQUENCY~~
CONVEYORS



to make our point quickly

Take your pencil and check off *why* you should make your castings with Penolyn Core Oil. First, you are assured maximum foundry efficiency. Second, you'll find there is a grade of Penolyn Core Oil to meet the most exacting requirements of every Foundry and Core Room practice. Third, and most important —

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the pig iron price increase in early July, the advance in coke elicited little complaint from foundrymen. Reason, of course, was that the steel industry wage settlement made higher prices inevitable.

The boost in coke was about 5.2 per cent, compared with less than 4.5 per cent for pig iron and the average 5.8 per cent for steel prices. Coke was entitled to the more generous consideration because prices had remained unchanged since November, 1952, when Office of Price Stabilization had granted relief for higher coal prices. The increase at that time was $1.50 a ton. Pig iron, on the other hand, had held unchanged since July 1, 1953, when there was an upward adjustment of $1.50 a ton. In contrast, steel prices were raised in mid-1953 and 1954 as well as 1955.

Except for two blast furnaces of United States Steel Corp., one each at the Gary and South Chicago plants down for relining and repairs, all of the remaining 41 stacks are operating. Youngstown Sheet & Tube Co. relighted its No. 4 furnace at South Chicago July 28. This unit had been idled last September.

Philadelphia—Considering vacations and hot weather, gray iron casting demand has held up very well this summer. Traditionally, although not always, demand improves after Labor Day, and casting makers are confident that this will be true this year.

August was more active than July, when vacations took the heavier toll of suspensions at both casting producing and consuming plants.

Better than anticipated business is reported not only in gray iron but also in malleable, steel and nonferrous castings. In all categories operating rates, barring holiday suspensions, have hovered around five days a week and in some cases better, and with full working forces. Backlogs are building up.

Delivery promises in gray iron range three to four weeks at least, and in steel castings, six to eight weeks. Promises on malleable castings run five weeks or better, with the trend upward, especially now that the railroads have become much more active. Brass and bronze shops are certainly holding their own. Their delivery promises may not be any more extended than three to four weeks, but operations are tighter.

In general, demand is diversified. However, construction requirements, including pipe, still lead, and there is a notable quickening in demand

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Bucket tilt-back at ground level means a full load at every grab, and permits low carrying position for travel. Other advantages are longer forward reach, greater longitudinal stability, extremely low maintenance because of easy accessibility of all parts requiring service, and design of the husky, trial-proven engine.

Special attachments are available for special jobs—forks for palletized loads, crane hooks for hoisting, and special buckets for dense materials. Catalytic exhaust system is available for inside work, where required.

Compare these and SHOVELOADER'S many other features with loaders costing $350 to $400 more! Write for complete information. The Baker-Raulang Company, 1223 W. 80th St., Cleveland 2, Ohio.

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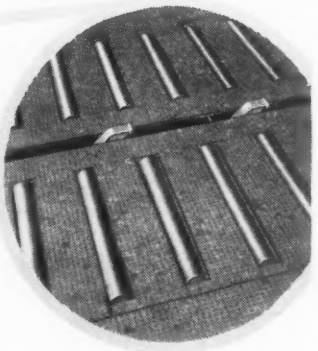

IN THIS modern foundry, heavy molds weighing from 15,000 to 20,000 lbs. are handled easily on an Alvey-Ferguson Heavy Duty Roller Conveying System with an air operated reciprocating pusher between the two lines of rollers. (See inset photo)

For handling molds, flasks and sand in *your* foundry a completely co-ordinated Conveying System engineered by Alvey-Ferguson will reduce worker's fatigue, lessen breakage, increase efficiency and production in the same space—and therefore reduce costs . . . An Alvey-Ferguson *Engineered* Conveying System quickly *pays for itself in savings!*

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for railroad castings. Shipyard needs lag, but should improve as there are more ship awards in the East.

Los Angeles—Despite some mid-summer vacation shutdowns and the usual hot weather slump, foundries in this district reported July and August business was much higher than anticipated. Demand from commercial users has increased, with defense work continuing heavy. July business for most steel foundries was 20 per cent better than a year ago. August figures are expected to be the same.

Recent suggestion from Washington that Air Force production should be relocated to inland sites has had a healthy effect on local foundrymen. Faced with the possibility of losing key defense contracts, they began to beat the bushes for commercial orders. The result was a steady increase in commercial work, which combined with continued defense orders to push operations beyond normal capacity in many shops.

Foundry purchases of No. 1 cupola cast continue heavy, at $42-$44 per gross ton. Scrap dealers say their cast scrap inventories are still plentiful, and no shortage is anticipated. Foundries are using care to limit their scrap buildup, and maintain that their heavy purchases are necessary for jobs on hand.

New York—Gray iron shops are operating close to five days a week, but heats are on the light side. Business is not brisk, but is better than a year ago, and casting makers believe that after Labor Day, with the vacation season and most of the hot weather out of the way, they can look for better things.

Improvement in railroad equipment requirements is encouraging, especially as they apply to malleable operations. In case of the latter, demand for pipe fittings has been well sustained and with added railroad requirements coming along, operations are at the best level in a long time.

Brass and bronze shops reflect the continued high rate of building activity, and demand for valves and pumps is somewhat better. Shipyard needs, however, are off, despite news of new ship contracts being placed along the eastern seaboard. This work, though, will make itself felt a little later in the year, casting makers believe. Aluminum shops are doing well, with demand more diversified. In addition to aircraft and radar requirements, demand is brisk from manufacturers of oil burners and household appliances.

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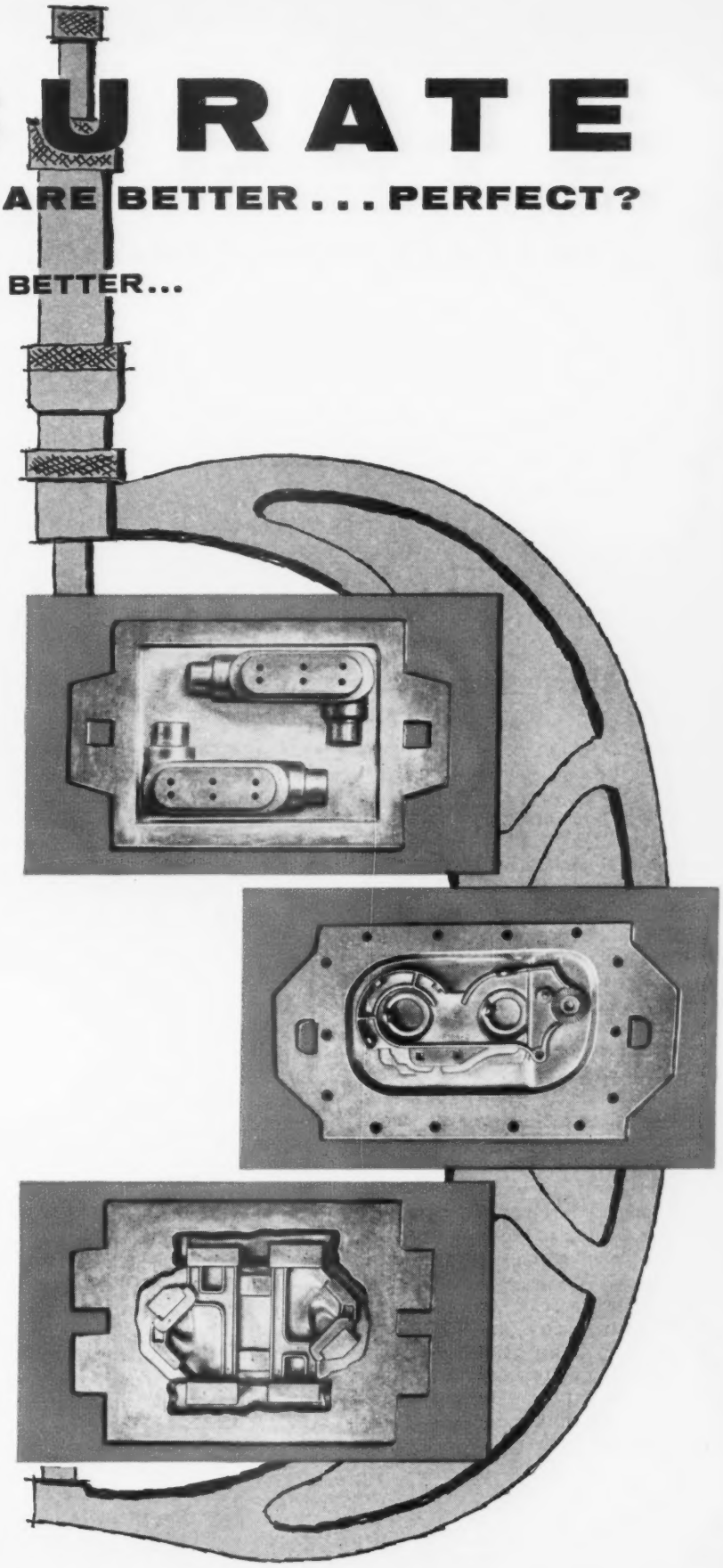

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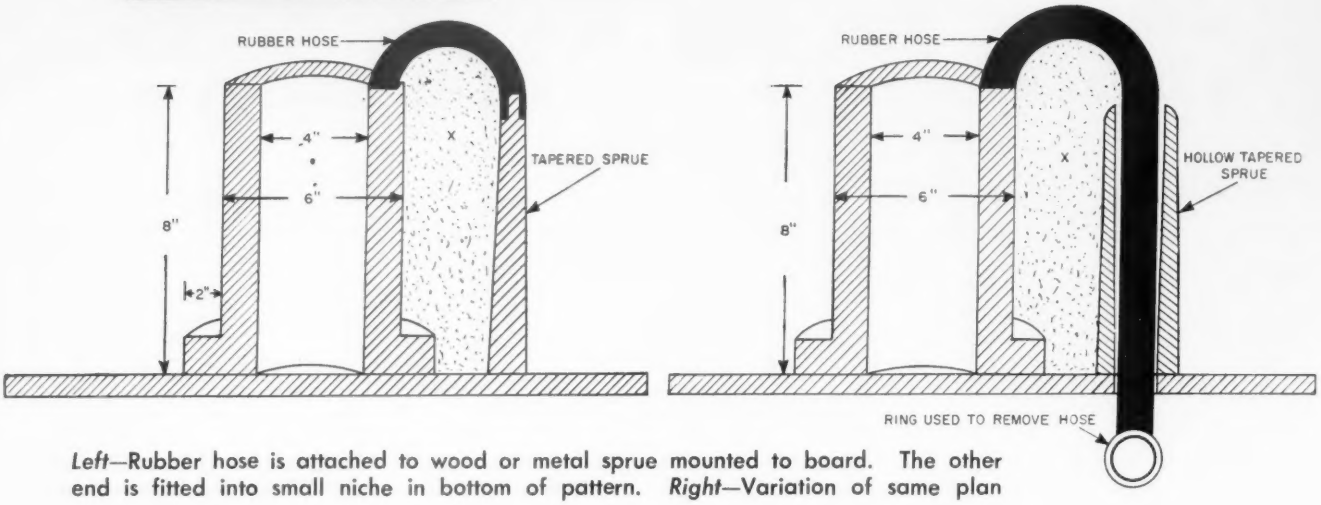
Trouble Shooting

By C. W. AMMEN



Left—Rubber hose is attached to wood or metal sprue mounted to board. The other end is fitted into small niche in bottom of pattern. *Right*—Variation of same plan

The Rubber Horn Gate

DEAR CHARLIE:

About three or four months ago I started making a few castings for a machinery manufacturer in small quantities. You know, one of this, two of that and three of this. Now we've got into a job of making some brass backs for him for some bearings, and the doggoned thing looks like it's going to be pretty continuous.

These bearing backs are made up in pairs, each pair making one complete bearing. The patterns are mounted on a plate, side by side. Each half-bearing has a 2-in. flange on one end, an 8-in. over-all length, a 4-in. inside diameter and a 6-in. outside diameter. These patterns are screwed down on a metal plate by the flange. The pattern is parted right at the top of the flange, putting the two complete half-bearings all in the drag.

Now, here's what's happened. We've been making these brass backs all in the drag, using a horn gate coming in on the bottom, and are getting excellent results. We have fractured several sets, and the customer's completely satisfied; they apparently are holding up in service. We were wondering if you might have some wrinkle up your sleeve as to a rapid method of applying and removing a horn gate from the drag. This would not only help us out, but would prevent us from having to use a cheek if we decided that we were going to make them in production by gating through the bottom.

Now, Charlie, with us this job is no joking matter. It amounts to several hundred of these bearings a month. To some operators this wouldn't seem like a lot, but to us it's a nice little chunk of business.

Along with the horn gate problem, Charlie, this old boy brought by last week a mandrel and a chill for putting the babbitt in these dogonned things.

He was having this babbitt work done outside and can't see why we can't babbitt the bearings at the foundry if he rough machines them. We're supposed to throw the babbitt in and ship them to him for finish boring. Besides this, the old boy wants to supply us with the chill for the babbitt operation and also with the babbitt metal iself. We can give it a fling all right, but our experience in babbitting any kind of bearings is extremely limited. Would like to give this babbitt part a try at any rate and would appreciate any info along those lines if it's not too involved.

Sincerely,

SAM

DEAR SAM:

About the best wrinkle I've ever seen on the rapid-removal type horn gate is illustrated in the two drawings above. The sketch at left shows a piece of rubber hose attached to a wood or metal sprue mounted to the board. As the drag is rammed up, other end of the hose is fitted into a small niche or hole in the bottom of the pattern, and the sand is rammed up firmly in and around the section marked X. When the pattern is drawn out of the sand, the hose just comes right on out. This seemed to work pretty well at a shop where it had been used for about 20 years.

The right-hand sketch is along the same lines. This method was being used in the same shop on an extremely deep job. It consisted of a medium-hard rubber hose that went through the plate, through a hollow tapered sprue mounted on a drag side of the plate and then over to the pattern. It had a ring on the cope side, and after the drag was rammed up and rolled over, the hose was withdrawn, leaving the plate holding the body of sand at point X on the drawing.

They told me at this shop that it doesn't seem to make much difference whether the hose is curved and put into the pattern or just laid across the bottom of the pattern. But you must be sure that it's rammed up good and tight and that after the pattern is removed the horn is really blown out. Also, you must go down in the actual cavity in the drag, open up the entrance where the horn gate enters the bottom of the cavity and blow that out well so that no little loose ledges of sand wash off into your job.

Apparently you could extend this rubber hose proposition across the bottoms of more than one pattern. With a little investigation and fiddling around, you might come up with a more useful means of applying this "rubber horn gate." No doubt you've seen pipes and rods rammed up against the bottom of a pattern and drawn through the side of the flask as part of a difficult bottom

the new "80" Preparator

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REALLY RUGGED CONSTRUCTION — No other units as rugged. Built to stand the severe punishment of use with front end loaders.

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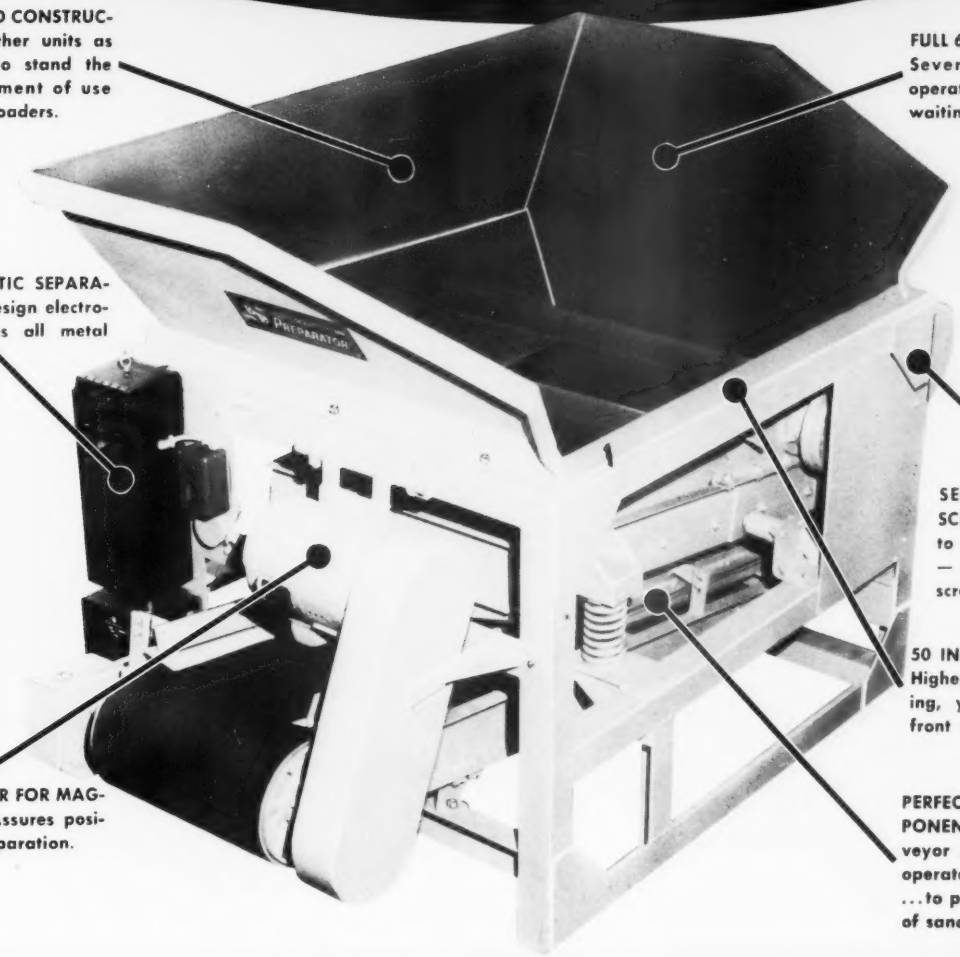

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Now, highest capacity and above floor construction have been combined in the new B & P "80" Preparator. Up to 78 tons of sand may be thoroughly conditioned each hour, yet overall dimensions and space requirements are lower than for machines of far less capacity.

The new "80" is available for both independent use and for use with Speedmullor-Preparator units. A loading height of only 50 inches makes it usable with any front end loader. The large hopper capacity of 65 cubic feet facilitates fast loading with no waits while the hopper empties.

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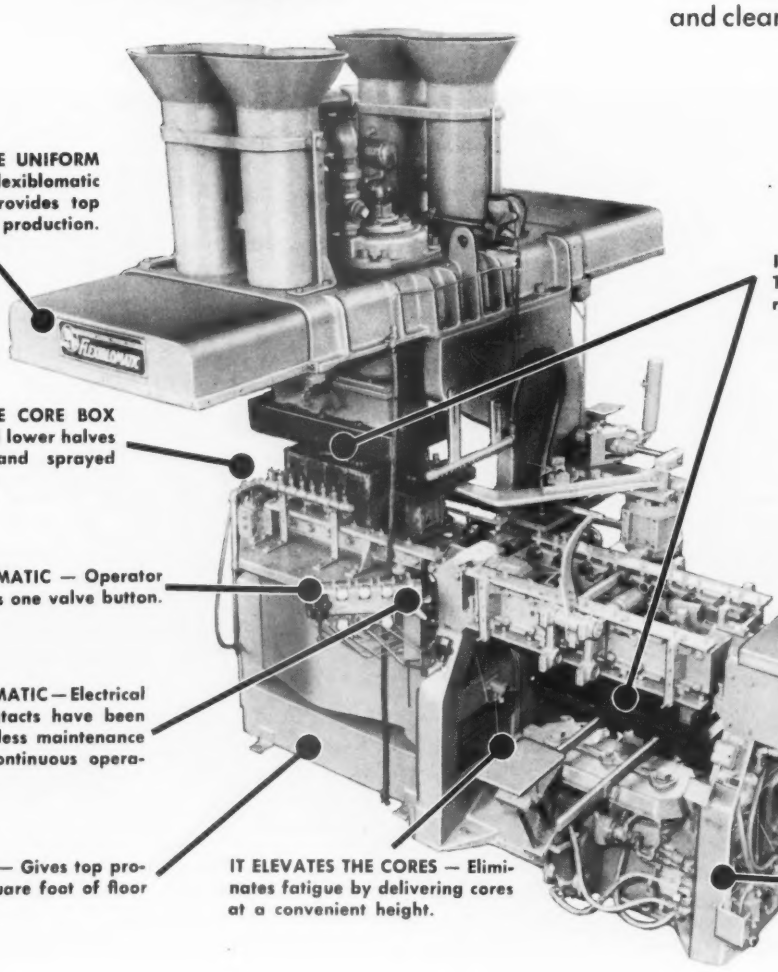

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IT DRAWS MORE ACCURATELY TR Rol-A-Cor is a precision machine designed for top accuracy.

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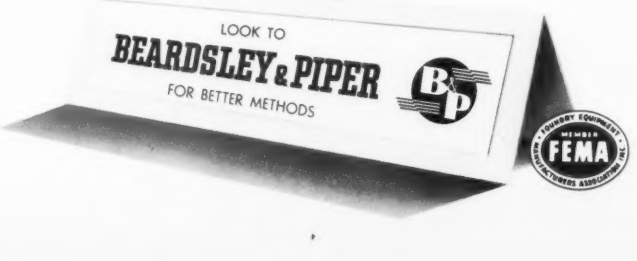

gate on a particular job. Well, this is along the same line.

I watched them in this one shop putting up some mighty tall jobs on a jolt-rollover draw machine with a rubber hose for a horn gate. I also took a good close look at the resulting castings, and I can't see anything wrong with the idea at all.

As to the babbitt operation, I don't think it's particularly tricky. Certain basic fundamentals, however, must be adhered to to get a good combination of strength of the backing material with the bearing properties of the babbitt metal.

I don't see how the old man can make a rough cut on the backs and then ship them to you to be babbitted; that final machining cut on the back should be done in close proximity to the subsequent babbitting operation so as to minimize the amount of handling. Even fingerprints on the surface to be babbitted are detrimental and will give you trouble. Basically the procedure is fairly simple, but it must be done with care in order to insure a good finished job of babbitting.

Of course, we've all had our hand in smoking up a shaft on an old cupola blower or something that's riding on babbitt bearings and putting a little babbitt-rite or something like it around the ends and pouring up a babbitt against a shaft that's been smoked with a little acetylene. Most of them, however, have grooves in the backs to give a mechanical bond. This old boy is searching for what is commonly known as a chemical bond.

For what it's worth, however, here is the general procedure involved. On the back, regardless of the material, whether it be bronze or steel, the final machine operation should be made without a water soluble cutting lubricant or any oil. It should be a dry cut made with a sharp, V-shaped tool with a very fine feed. The surface to be babbitted should have the appearance of a phonograph record with absolutely no polish or bright surfaces or spots anywhere on the surface. You must keep this surface as clean and free from oil as possible. It shouldn't even be wiped with a cloth or piece of waste, and it should be removed from the machine and transferred with a minimum amount of handling to the point where the tinning operation is to be performed. These remarks apply particularly to the surface to be tinned.

As the next step, the machined back is submerged in a boiling solution of a good alkaline cleaner. Several excellent cleaners are on the market for this purpose. The solution should be boiling hot and should completely remove all grease, grime and dirt. The back should remain in the solution for a few minutes or so, depending on its condition. After its removal from the alkaline-type cleaner, the back is submerged in a 50-50 hydrochloric acid solution, which is held at between 170 and 190° F. It should remain in the hydrochloric acid bath to etch four to six minutes. When the back is removed from the acid etch, it should show a completely clean and completely wet surface. Under no condition should it shed any water or show any islands which would indicate oily surface spots. If it does show anything like that, you have to start all over and go back into the alkaline cleaning solution and re-etch again. Don't make the

Correction

In the article, "Designing a Small Cupola," which appeared under "Trouble Shooting" on page 128, June issue, an error appeared in item 3 relative to the amount of air required. Correct formula should be $0.7854 \times A^2 \times 7 \times 15 \div 60$ instead of the one given.

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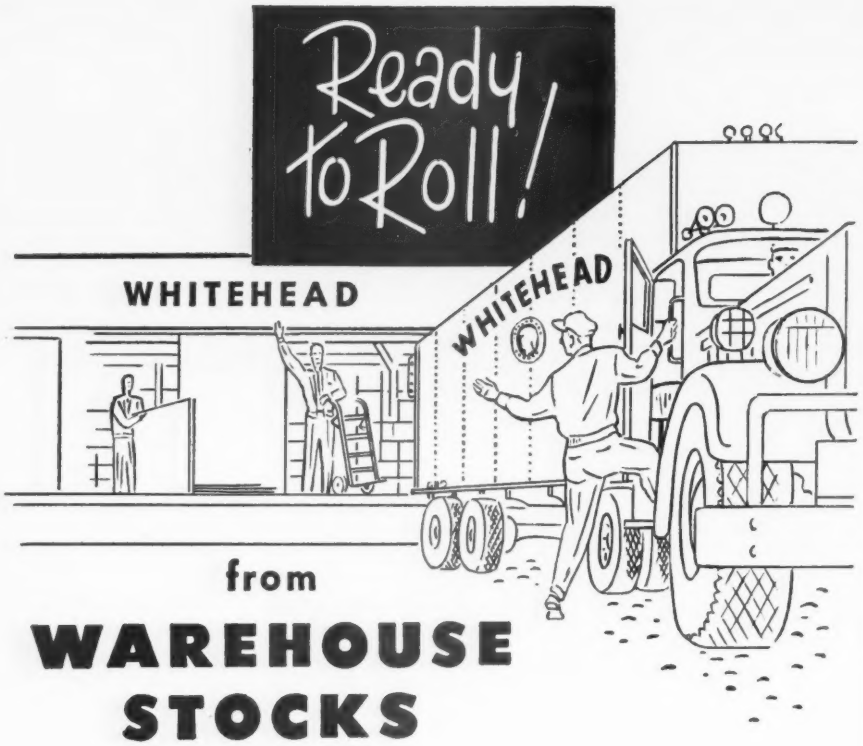

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mistake of thinking that the following fluxing treatment will correct any imperfections or greasy spots on the surface that's going to be tinned.

We're now down to the point where you are ready to apply the flux. The usual flux for this type of work is a zinc-ammonium chloride type. Such fluxes are extremely satisfactory. They are like the alkaline cleaners in that several commercial fluxes available for this use will produce excellent results. This flux should be held at a temperature of about 160° F. Be sure that the surface to be tinned is completely submerged.

The back then is submerged in the tinning solution, rather slowly. Several tins are on the market for this purpose. One of the most commonly used is 15 per cent tin, 1¼ per cent silver and ¼ per cent bismuth, the remainder being lead. A second is 4 per cent tin, 12 per cent antimony and the balance lead. Still another is 10 per cent tin, 10 per cent antimony and the balance lead. Any one of these three is satisfactory.

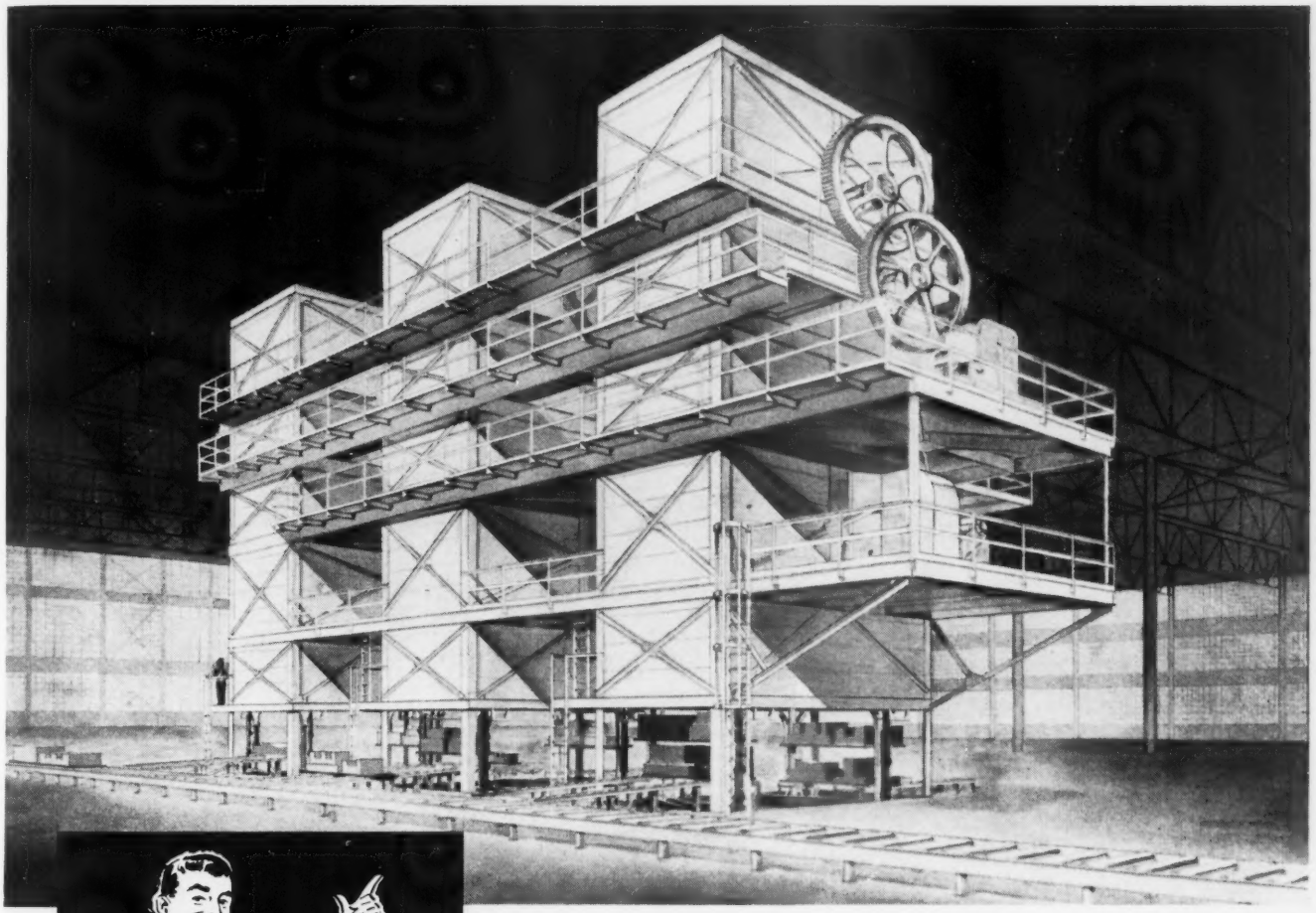
Temperature Is Important

The temperature of the tinning bath is very important. It should never be too high—that is, so hot that the tin surface of the back oxidizes or turns yellow when it's removed from the pot. The tin surface always should remain bright and clean. Generally speaking, a temperature over 650° F is likely to be a little on the hot side. This point is something that you are going to have to check.

If a small area on the back doesn't tin successfully, it should be dressed by hand. Use a little sal-ammoniac if necessary and clean these spots off with a little wire brush or portable grinder until you are down to the base metal. Be sure that it is free from dirt, grease or oxides and paint that surface with the 50-50 solution of hydrochloric acid water. Apply a little flux, and you then can tin this surface by hand with stick tinning, using the same alloy that the original tinning was performed with.

Having completed the tinning operation, you are all set to pour the babbitt. In most instances, the mandrel should be about 100° F hotter than the back—that is, when the mass of the metal in the back and the mass of the mandrel are approximately the same. Should the mandrel mass be greater than that of the back, it would cool at a slower rate and the temperature should be adjusted accordingly.

Directional solidification should progress from the back toward the mandrel; that is, the first part of the babbitt to solidify should be that at the face of the back and at the



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HANDLING EQUIPMENT

5GY-1

bottom, whereas the last to solidify should be at the surface of the mandrel and at the top. The only way to accomplish this result is by adjusting the temperature of the mandrel.

As soon as the mandrel and the back are at the proper temperature, the babbitt should be poured. The heat of the back plus that of the molten babbitt will keep the bonding metal fluid as the babbitt fills the mold. This procedure makes the best union between the babbitt and the back.

An important point to remember is that the babbitt always should be poured in one continuous operation, never in more than one shot. If the job is going to require 25 lb of babbitt, you should use a 25-lb ladle and pour the whole 25 lb kerplonko, in a steady unbroken stream, without any bobbling or change in velocity. This point is most important, Sam. If you have 500 lb of babbitt to pour, to prevent the formation of layers you'd better pour it from a 500-lb ladle and avoid any interrupted pouring.

The best type of ladle is a teapot-type. If it isn't available, the one you use should have a bridge across the lip, or someone should hold back the dross with a piece of wood. Needless to say, pour with as little turbulence as possible. The babbitt should flow quietly and continuously into the mold until the mold is full.

If you botch a babbitt job and try to remove the babbit to start all over again, as you will from time to time, do not sweat the metal off with a torch. Remove it by dipping the whole piece into a bath of metal kept just for that particular purpose.

With a little practice, you shouldn't have too much trouble, but my recommendation is for you to take it easy and analyze it from all angles as to its worth. You should come out on top.

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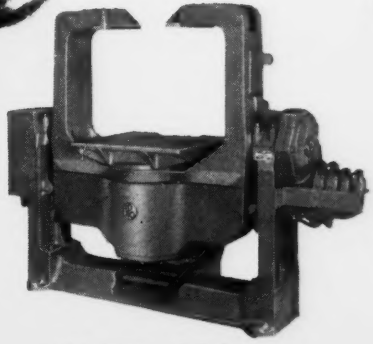

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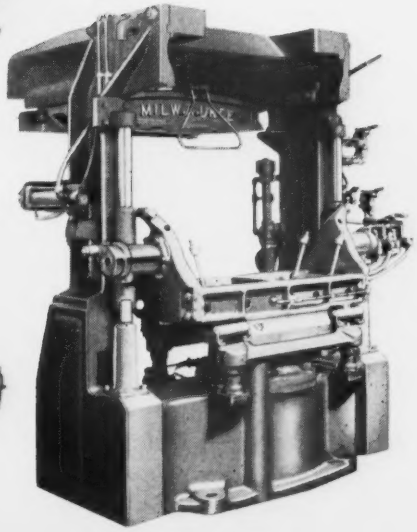

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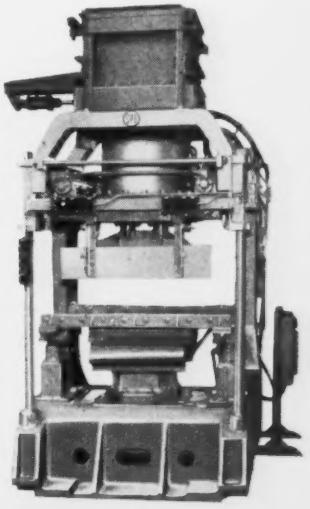


MODEL 2302

Technical Reports at the International Foundry Congress

By VINCENT DELPORT
European Manager

EIGHTEEN papers, including 12 exchange papers from foreign associations, were presented and discussed at the technical sessions of the International Foundry Congress held recently in London (August FOUNDRY, p. 180).

Limiting the number of papers made it possible to devote ample time to presentation and discussion. The subject matter of the contributions covered most aspects of foundry practice and metallurgy. Four papers dealt with cast iron. Steel, nonferrous alloys and light alloys were each the subject of one paper. Two were devoted to melting furnaces, three to molding sand, and the remaining seven covered various other aspects of the foundry industry.

During the half-hour periods preceding and following the presentation of papers, technical films were shown. Arrangements for them were under the direction of Frank Hudson, Mond Nickel Co., London, president of the London Branch of the Institute of British Foundrymen.

The exchange paper from the American Foundrymen's Society was by Hiram Brown, chief metallurgist, Solar Aircraft Co., Des Moines, Iowa. The paper was entitled **Evaluation of Casting Processes,** and its object was to point out the advantages of castings for many applications, and the advantages or limitations of the various foundry methods.

These points are weighed against the fact that in far too many cases castings are fighting to survive. The reason for this is ascribed to a number of factors: (1) Ignorance of casting design and desirability on the part of designers; (2) casting too often is used only as a substitute for another process instead of a component actually being designed for casting from the start; (3) poor quality of castings from many sources; (4) too much effort expended in taking business from some other type of casting rather than taking jobs away from competitive industries; and (5) stifling the interchange of foundry knowledge and failure to get maximum results from established casting methods.

Since high quality standards are here to stay, it is recommended that two steps be taken: (1) Start engineers thinking about castings while they are in college, and (2) foundrymen must accept high quality standards and make every effort to improve their casting processes to meet those standards rather than constantly complain that quality requirements are too severe.

Among other conclusions, the author refers to new processes and says that it is difficult to evaluate properly a process early in its history; he also states that new processes are often misused by engineers; for instance, many parts which could be machined economically are cast in investment or shell molds. The part is costly because these processes strive to produce good tolerance and finish; if these qualities are not needed, why demand them or pay the price required?

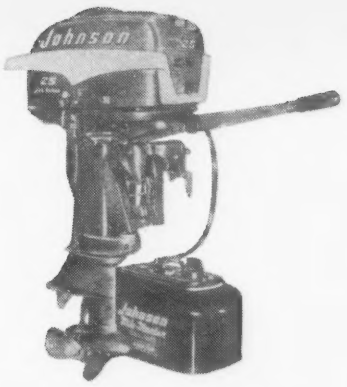
Prof. A. Portevin and J. Pomey were the authors of the exchange paper presented by the Association Technique de Fonderie, Paris. The subject was **Residual Stresses in Castings.** The authors point out that even in the absence of any exterior force, castings, like all metallic components that have been subjected to mechanical, thermal or chemical treatment (which treatment is never truly homogeneous), contain residual stresses. These stresses are hidden, they are necessarily internal, and they are at the same time both tensions and compressions; these conditions are covered adequately by the term "residual stresses."

These stresses and their effects can be isolated and measured by a number of normal procedures, which are dealt with in the paper. These depend on factors, the examination of which leads to the development of measures to take either to avoid risks, or to make the effects of the stresses favorable.

In their conclusion, the authors state that, while internal casting stresses in heavy castings and castings of irregular section or shape must always be dealt with first during casting and then by stress relief annealing, conversely, for small castings of uniform shape and regular section produced in large quantities for severe stress conditions, treatment can now be investigated and applied to develop a prestressed state favorable to service conditions, provided that the material is suitable.

R. Baggio, attached to the Fiat foundry at Turin, presented the exchange paper from the Italian Foundrymen's association. His subject was **Quality Control in a Large Foundry in the Automotive Industry.** The author discusses the aims of modern quality control and shows how these no longer concentrate simply on separating defective from sound castings, but provide a means of preventing the production of faulty castings by instituting regular checks and controls at all stages of manufacture. Methods of quality control, using the most up-to-date techniques suitable for foundry work are reviewed.

In his conclusions, the author states that the use of the systematic controls described in the paper has produced very satisfactory results. He mentions that no less than 260 dif-



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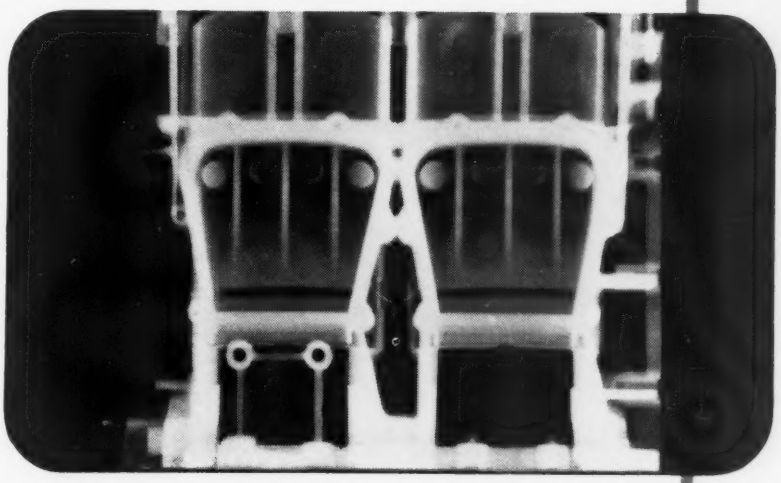

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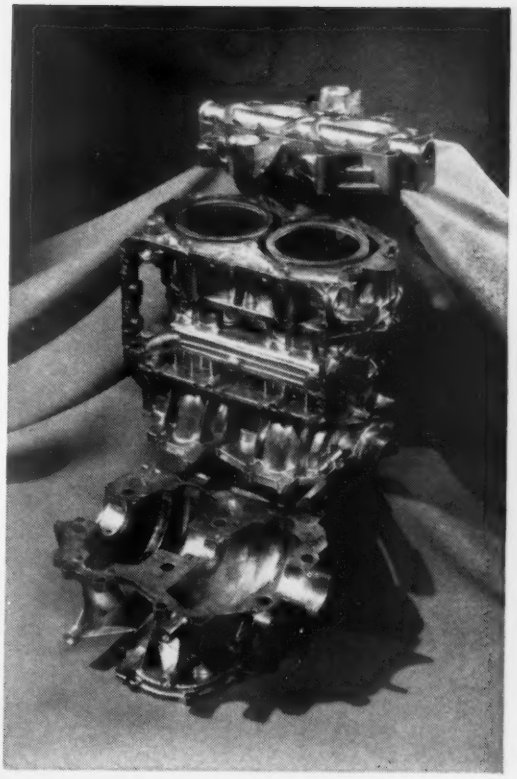

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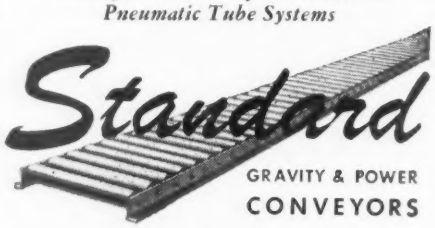

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ferent types of gray iron and malleable iron castings and some 320 types of light alloy castings are manufactured in the Fiat foundries. Referring to statistical methods of quality control, he says that these have been examined closely by the personnel of the foundry, but they were considered to be of limited value in foundries producing a wide range of products.

From the Institute of Indian Foundrymen, S. G. Athanikar presented an exchange paper having the title **Molding in an Indian Foundry.** The paper reviews the scope and facilities at the foundries of the Indian Iron & Steel Co., Kulti. The author gives details of the procedures adopted for molding four typical castings of the medium to large weight range. In this way, the versatility of the methods—loam molding, core assembly, and sectional molding—is developed. The descriptions reveal expedients adopted in the Indian foundry which may be of value to practical foundrymen in other countries.

The exchange paper from the Verein Deutscher Giessereifachleute, on **Chemical Reactions in the Cupola,** was by Dr. Ing. G.A.H. Jungbluth, professor of Mechanical Technology at Karlsruhe Technical High School, and K. Stockkamp, head of the fuel economy department in the Buderus Ironworks, Wetzlar. The authors recall that a theoretical study of the chemical reactions in the cupola leads to the conclusion that with increasing temperature in the reaction zone, e.g. through the employment of hot blast, a reduction of iron oxide, a reduction of silica to silicon, a certain degree of reduction of manganese oxide under suitable conditions, a transfer of phosphorus from the charge to the iron, and a reduction in the sulphur content of the iron will all take place when the cupola is operated with an acid slag. These conclusions were verified by numerous tests undertaken on a hot-blast cupola of 24-in. diameter at the tuyeres. It was operated with coke additions of 9, 11 and 13 per cent at blast temperatures of 200, 300, 400 and 500° C.

The Danish Foundrymen's Association contributed an exchange paper entitled **Nomogram for Fairly Hot Non-Alloyed Iron Cast in Ordinary Dry Sand Molds,** by Sv. Thegel, attached to the Burmeister & Wain foundry, Copenhagen. The data are established as a result of testing 50 test bars each of 20, 30 and 40-mm diameter. All 150 bars were ordinary daily control test pieces.

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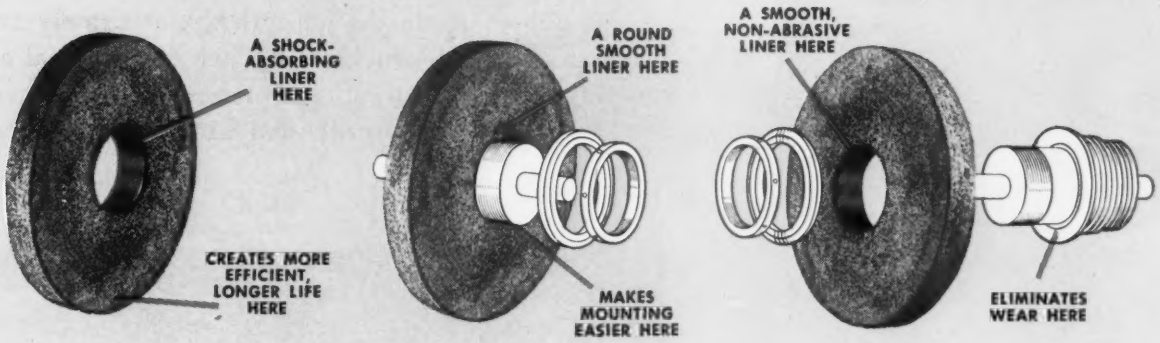
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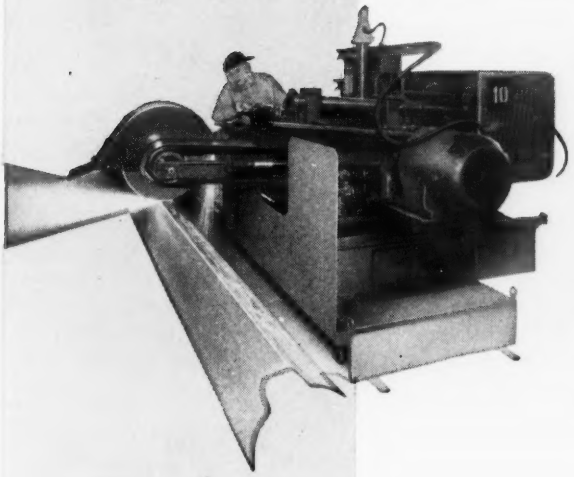

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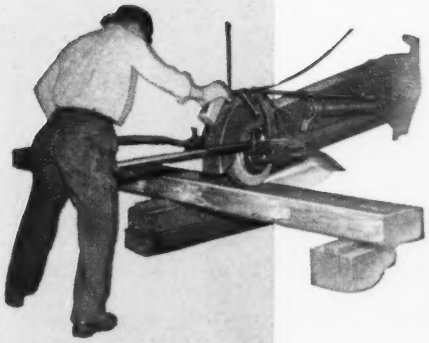

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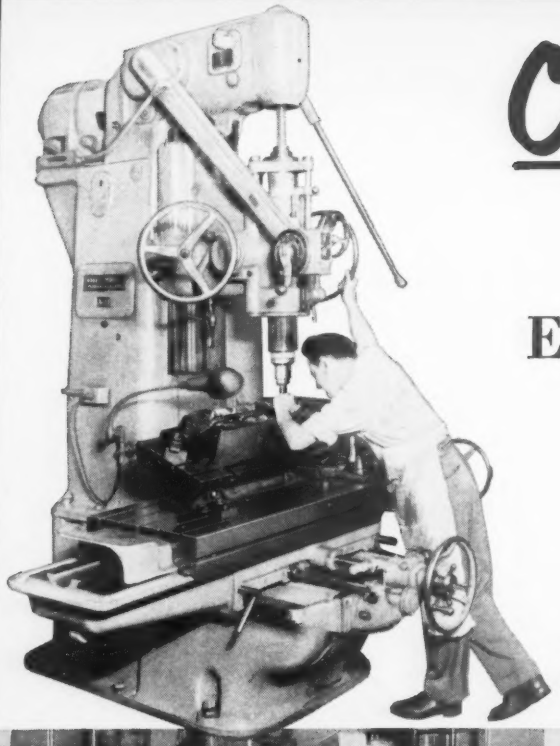

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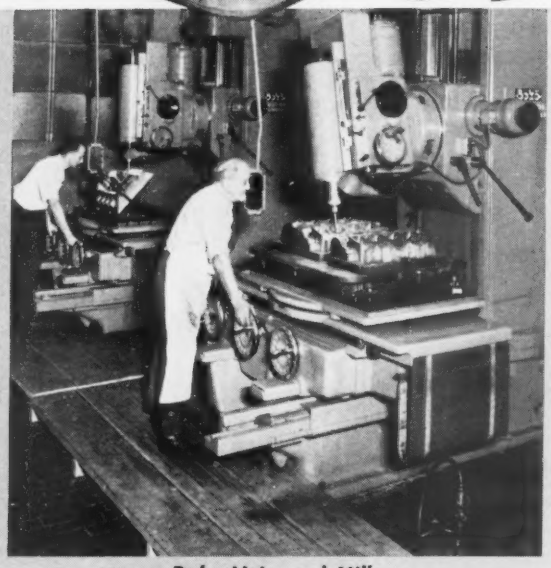

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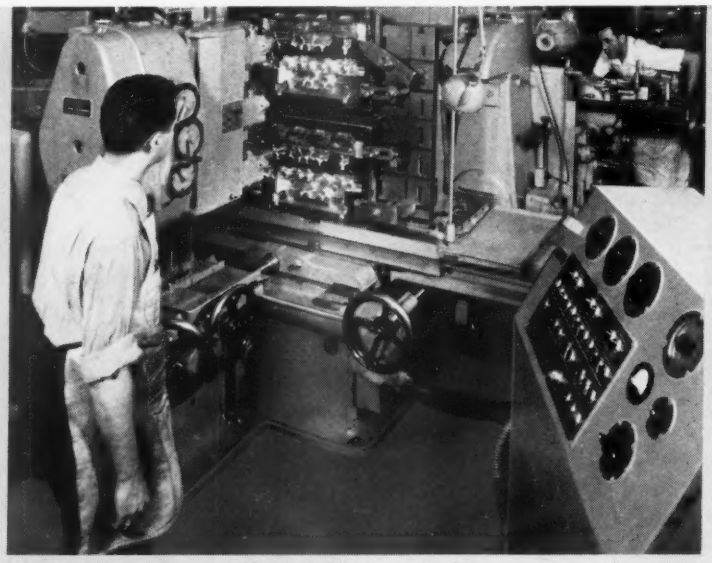

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cided to fix the nomogram between section thickness, (C + 1/3 Si) and (H − 30P), in which H is the brinell hardness. By means of the equations determined between (C + 1/3 Si) and (H − 30P) for the various diameters, three coherent values for (C + 1/3 Si) and (H − 30P) for each diameter were calculated and the nomogram was constructed. Within the above mentioned field of utilization of the nomogram, figures for the (C + 1/3 Si) which must be present in the iron in order to get a desired hardness in a given section thickness, can easily and quickly be obtained.

From Norway came an exchange paper presented by Bull Simonsen, of the Central Institute for Industrial Research, Oslo, and Dr. Floyd Brown, Naval Research Laboratory, Washington, formerly temporarily associated with the Norwegian Central Institute. This exchange paper was from the Norwegian foundry association, Norges Stoperitekniske Forening. The subject was **Widmanstatten and Other Abnormal Graphite Forms in Cast Iron.**

The paper describes the appearance and condition of formation of a number of abnormal graphite forms in gray cast iron, associated with impaired mechanical properties. It is postulated that the formation of Widmanstatten type graphite is not a function of a critical cooling rate, nor is it reproducible after heat treatment.

Investigation of trace elements present along with the abnormal graphite forms led to the suspicion that lead and tin might be causatory features, and experiments proved that, in fact, Widmanstatten type graphite was associated with a lead addition to a melt, giving low tensile strength. Other experimental work is proceeding, and the authors offer the conjecture that the anomalous forms reflect graphite-metal interfacial energies altered by the presence of small amounts of impurities. In this connection, the authors note that small amounts of residual elements like Pb, Bi, Sb, Sn and others may prevent the formation of nodules when Mg is added.

Gases in Cast Iron was the subject of a report submitted on behalf of the Joint Committee of the Institute of British Foundrymen and the British Cast Iron Research Association, presented by the chairman, H. Morrogh. This committee has made an exhaustive examination of the techniques for the determination of the gaseous elements in cast iron and for the sampling of cast irons for these determinations.

The vacuum-fusion method has been chosen for the determination of oxygen and nitrogen, but a chemical

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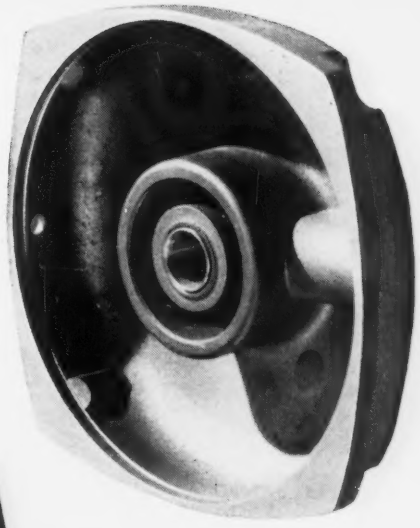

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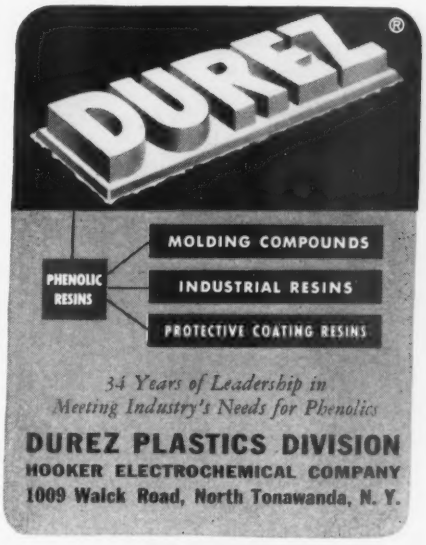

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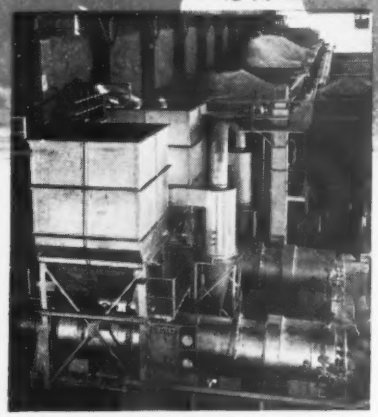

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method has also been used for the determination of the latter. The vacuum-fusion method is not ideally suited to the determination of hydrogen and an improved vacuum-heating technique has been developed. The sampling of cast iron for gaseous-element determinations is shown to be very important. Differing results for oxygen content may be obtained according to the position of the sample in sand cast samples. Small chill cast samples are shown to give reproducible results for oxygen, nitrogen and hydrogen using the vacuum-fusion process. Using small chill cast samples, metal has been sampled at a number of works using a wide variety of melting units and melting practice. These results are presented in detail.

It has been shown that oxygen itself does not influence the chilling tendency or the annealability of malleable iron. The oxygen may appear in some circumstances to have a chilling tendency due to its combining with aluminum which has a graphitizing influence. Nitrogen in cast iron is shown to be a carbide stabilizing element, the effect of which can be neutralized by small additions of aluminum. The influence of the amount of steel scrap on the gaseous element content of cupola melted metal has been studied.

A paper from the British Cast Iron Research Association on **Behaviour of Molding Sands at High Temperatures,** was by W. B. Parkes, assistant development manager, and R. G. Godding, sands investigator. The authors describe experiments made with an apparatus by means of which it is possible to raise the temperature of a sand test piece uniformly and rapidly; the maximum rate of heating attained is from room temperature to 1000° C in about two minutes. Stress-strain curves have been obtained on the heated sand, and the expansion can also be measured.

Tests show that the expansion of sand increases with hardness of ramming. The addition of organic materials such as coal dust and wood flour has a negligible effect on expansion, except insofar as it affects ease of compaction. Plain sand-clay mixtures have a deformation which at all temperatures up to the initial softening point of the clay is lower than the expansion up to that temperature; they are also brittle. Defects due to expansion are therefore frequent with such mixtures, particularly in green sand molds.

The addition of wood flour and many fibrous materials increases deformation slightly and reduces brittleness considerably at all temperatures. Coal dust has little effect on deformation, but reduces brittleness slightly at temperatures above the softening point of the coal.

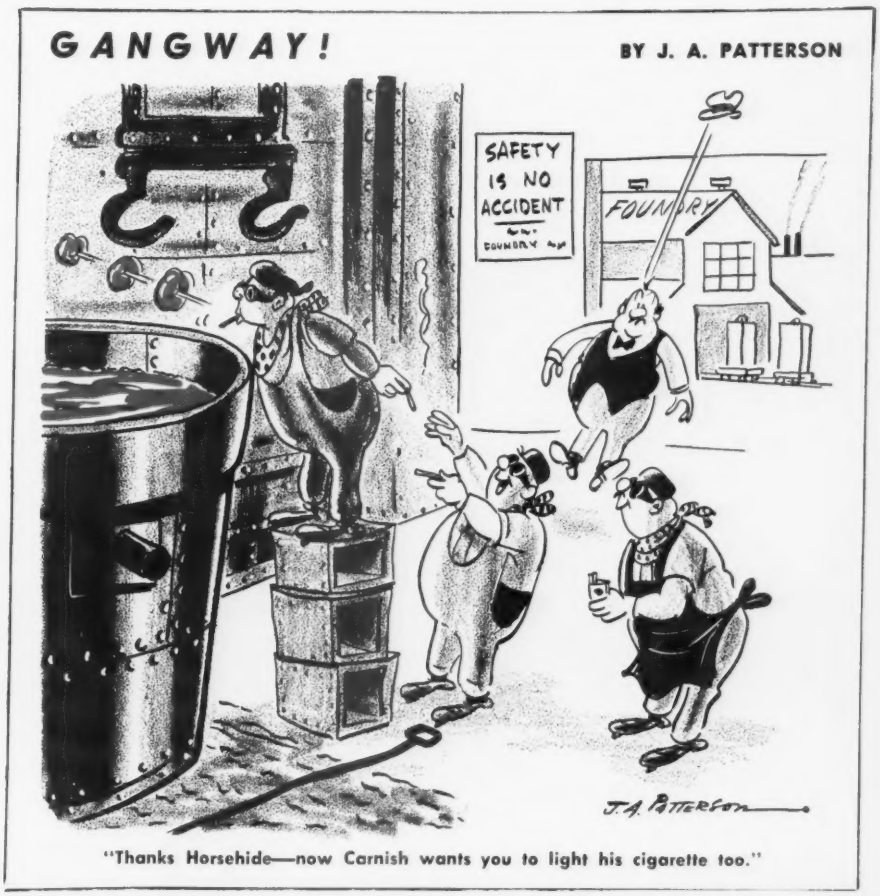
On behalf of the Swedish Foundrymen's Association, H. Petterson presented an exchange paper on **Spalling of Green Sand Molds and its Relation to Casting Defects.** Studies show that coarse grain sands with wide grain distribution, a high content of clay (preferably sodium bentonite) and an addition of coal dust, cereals or sugar are the most important factors pertaining to the composition of the molding sand that conferred good resistance of the molds to spalling. At very low moisture contents, the resistance was also very good despite low mechanical strength of the molds. Otherwise, the magnitude of the original moisture content had very little influence.

The effect of drying was not noted until the moisture content of the heat affected part of the mold was decreased below 0.4 per cent. Oven dried molds showed a much higher resistance than green sand molds. Certain additions, particularly those of an acid character, had a detrimental effect on the resistance of bentonite bonded molds. Except at extremely high and low hardness values, the resistance increased rapidly with decreased mold hardness. With bentonite-bonded molds without extra additions, the time before spalling started decreased with increasing heating intensity only up to a certain limit, whereupon the resistance increased again.

Effect of Mold Material on the Solidification Rate of Cast Metals was the title of a combined report from three subcommittees of the Technical Council of the IBF. The first committee to investigate this work started in 1947. It was thought that the rate of solidification of a casting could be conveniently defined as the speed of movement of the solid-liquid metal interface away from a mold wall, and that by "slushing" a casting it would be possible to study this movement.

The conclusions drawn from experiments with this method are:— (a) That it is insufficiently sensitive to determine the difference of cooling power of different types of sand, and (b) that in all pure metals, or alloys freezing at a constant temperature, there exists a zone of partial solidification between the all-liquid and all-solid zones, and this makes the definition of the solidification rate difficult.

The next approach was to investigate the suitability of the pyrometric method for investigating the rate of solidification of cast metals. The main investigation was carried out by using this method and, by standardizing all variables, very good reproducibility was obtained. Some of the general conclusions are: (a) That the



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coarser the sand the greater its cooling power at a given ramming density; (b) the harder a mold is rammed the greater its cooling power at a given ramming density, other variables being the same; (c) the higher the moisture content of a sand the greater its cooling power when all other variables are equal; and (d) the presence of coal dust causes some increase in the cooling power of the mold in the case of casting sections up to 1½-in.

A paper based on a research report from the British Non-Ferrous Research Association was presented by A. Cibula, research investigator at the association. The title was **Influence of Grain Size on the Structure, Pressure-Tightness and Tensile Properties of Sand-Cast Bronzes and Gunmetals.** The paper deals with the study of the relation between grain size and properties, using grain refiners developed in previous work. Iron or cobalt boride, or zirconium carbide or nitride, were added to gunmetals containing from 2 to 14 per cent tin, 2 to 5 per cent zinc, and 0 to 5 per cent lead. For comparison, alloys were also cast without grain refiners.

Intergranular films of tin-rich eutectoid were more pronounced in the grain-refined castings, but could be eliminated by restricting the tin content to less than 8 per cent. Large intergranular particles of lead in the bearing alloys were also more numerous in the fine-grained castings. In both well fed and poorly fed castings, the total porosity was least in alloys of finest grain size. In castings with columnar structures, however, shrinkage porosity tended to concentrate at the center-line, leaving the skin of the casting sound, whereas in the fine-grained castings porosity was dispersed, leaving little or no sound skin, and largely occurred in layers perpendicular to the direction of feeding. Because of their unfavorable distribution of porosity, grain-refined castings had much poorer pressure-tightness and, generally, mechanical properties.

Equiaxial structures produced by the use of a low casting temperature instead of a grain refiner were associated with similarly poor pressure-tightness. For each type of casting there was a critical pouring temperature at which the macrostructure changed from columnar to equiaxial, accompanied by a dispersion of shrinkage porosity, and satisfactory properties were obtained only with higher casting temperature.

The results suggest that the mode of solidification of bronze and gunmetal castings varies considerably with pouring conditions. Solidification in alloys cast at high temperatures

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without a grain refiner proceeds largely by skin growth, whereas when grain refiners are introduced, or the metal is cast at a low temperature, equiaxial grains are nucleated throughout the casting and "pasty" solidification occurs.

L. Fletcher presented a paper on behalf of the Light Metal Founders' Association, through the Aluminium Development Association. The paper was entitled **British Aluminium Casting Developments.** It is noted that the successful entry of aluminum castings into fields traditionally held by other metals has been based on the adaptability of the metal for sound and economic casting, or for its advantages in fabrication and service—but usually on both factors. The characteristics of the Al-10 per cent Mg casting alloy LM10 are described in view of its emergence from principally aircraft applications into general use over a considerable range.

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Emphasis is placed on the flexibility of the permanent mold casting process, and on the influence of argon-arc welding developments in facilitating the use of relatively small cast sub-components for assembly into complex and often bulky products difficult or impossible to cast in one piece or to join by any other method.

In his conclusions, the author mentions that the peak annual output of aluminum alloy castings in the United Kingdom during the World War II was approximately 59,000 tons. Today the industry is producing at the rate of 90,000 tons a year.

The British Steel Casting Research Association contributed a paper on **Metal and Mold Research on Steel Castings.** This paper was divided into parts. Part I, "Solidification Mechanism" was by Dr. J. A. Reynolds, associated with the BSCRA and A. Preece, professor of metallurgy, King's College, University of Durham, Newcastle-upon-Tyne. This part of the paper examines some of the factors controlling shrinkage unsoundness in steel castings. It is shown that thermal-analysis data, obtained either by direct measurement or by simulation techniques, can be applied only to the control of gross shrinkage. Experiments are described which illustrate the usefulness of the volume: surface-area ratio as an aid to establishing directional solidification and so achieving this control.

Part II, by J. M. Middleton and Dr. J. White, University of Sheffield, was on "Mold and Core Bonding

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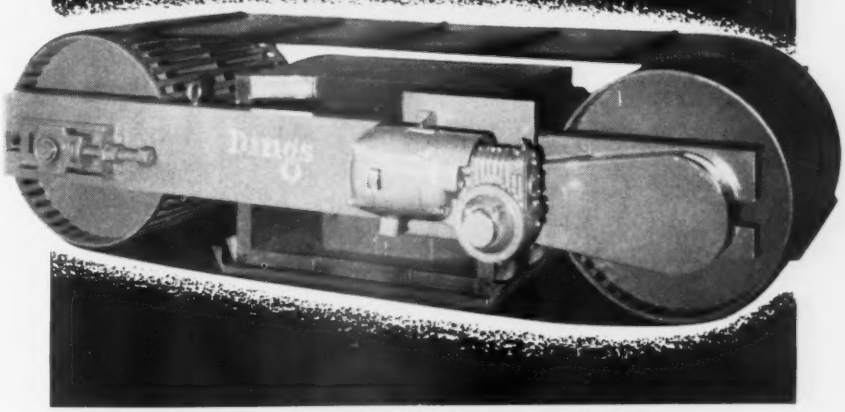

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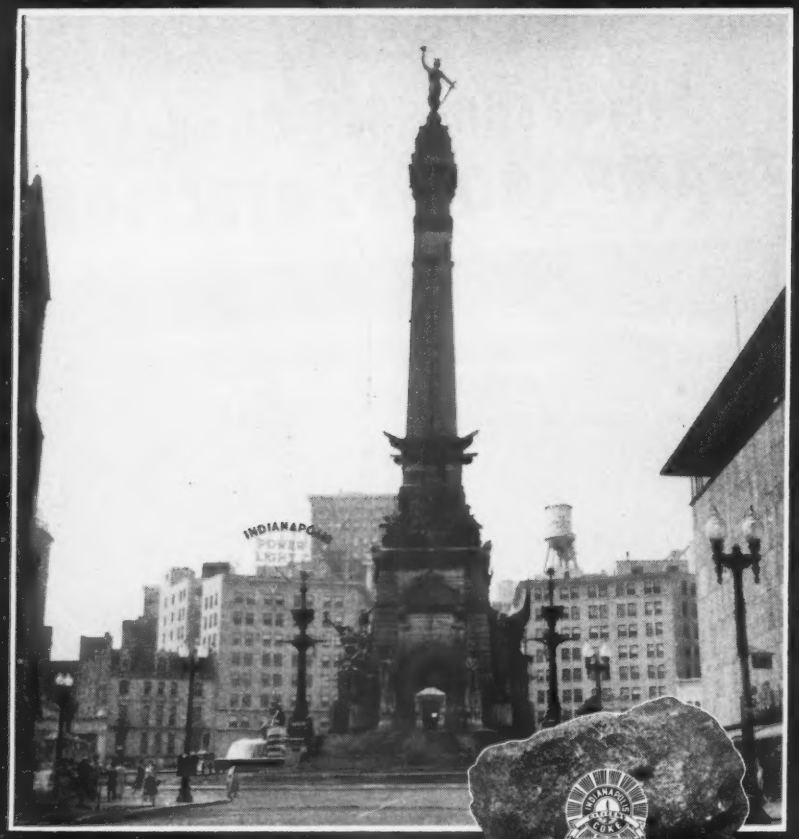

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Agents." This part opens with a description of tests carried out to determine the mineral classification of a bonding clay. The bonding properties, together with a "life" index of a number of bentonites from a wide variety of sources, are then compared, as also is a number of kaolinitic clays of British origin. While it is shown that the latter have inferior bonding properties as compared with the bentonites, mixtures of the two types of clay are indicated as offering certain advantages.

Compared Core Baking

Dielectric cured and oven-baked resin-bonded cores are then compared, and their relative susceptibilities to moisture pickup are investigated. The incidence of hot-tearing in steel castings is shown to be influenced not only by the degree to which the mold is rammed, but also by the type and amount of bond employed in the molding material.

An exchange paper from the Swiss Foundrymen's Association was presented by Borut Marincek of the Eidgenossische Technische Hochschule, of Zurich. The title was **Comparative Study on Melting Furnaces of Gray Iron Foundries.** The author states that the continual increase in the price of coal compared with the price of electricity and the increasing demand for improved quality cast irons are both leading to a reappraisal of the use of melting furnaces in the iron foundry, particularly since in the future the cost of an electric calorie may well become less than the cost of a coal calorie.

Against this background the use of the cold blast cupola, the hot blast cupola, the arc furnace and the induction furnace as melting units in the foundry are considered and compared. Owing to the different modes of operation of these furnaces and the resulting differences in the quality of the iron they produce, a direct comparison between them is not feasible. The examination is therefore mainly concerned with a discussion of the advantages and disadvantages of each and an indication of when the one or the other type is preferable.

The Association Technique de Fonderie de Belgique presented an exchange paper entitled **Results of Metallurgical Studies of the MBC and ADS Cupolas,** by Prof. A. de Sy, Robert Doat, Roger Balon and Lucien Winandy. The research was carried out under the auspices of the research organizations of FABRIMETAL. The MBC cupola is the metallurgical blast cupola, and the ADS is a type of cupola developed by the Centre d'Etudes et Recherches de

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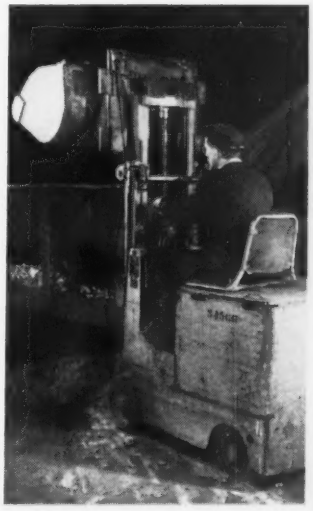

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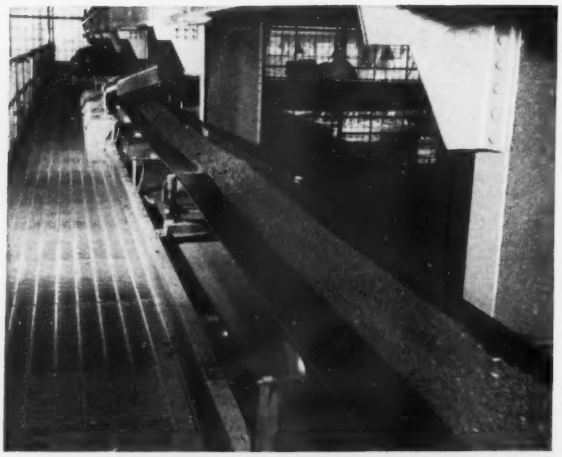

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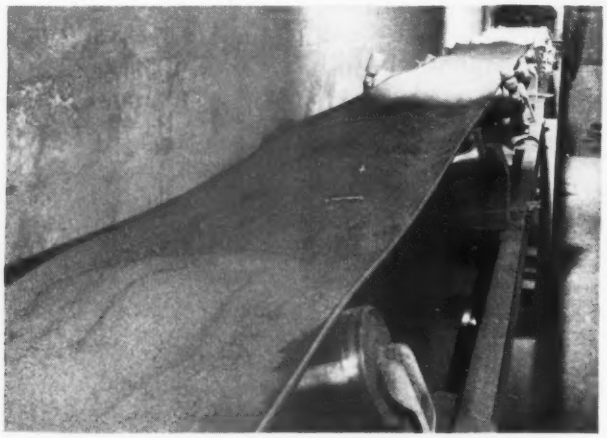

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The authors found that if the ADS cupola is compared when operating without lining in the melting zone (that is the sole method which has so far been studied in any detail), first with the MBC and then with the ordinary cupola, the ADS lies between the two. In the ADS the controllability factor is limited to the elements C and S, while in the MBC the control is extended to all the five normal elements of cast iron. It is thus apparent that the ADS is complementary to the MBC plant.

Described Investment Foundry

An exchange paper from the South African branch of the Institute of British Foundrymen was presented by J. Steele, foundry manager, P.D.L. Precision Castings (Pty.) Ltd., Johannesburg. The title was **A Jobbing Investment Foundry in South Africa.** The paper outlines the establishment of the first industrial investment casting foundry in South Africa. The period covered is five years, from the initial experimental stage to present-day full production capacity.

The Australian (Victoria) branch of the IBF contributed an exchange paper on **The Foundry Industry in Australia,** by A. W. Silvester, materials engineer with Repco Ltd., Melbourne. The paper is a description of the postwar foundry industry in Australia. It is divided broadly into four chapters: "Australia Today"; "Basic Material and Power Resources"; "The Foundry Industry"; and "Australia Tomorrow."

A report from Technical sub-committee T.S. 24 of the IBF on **Ingates** was presented by F. J. McCulloch, chairman of the subcommittee. It summarizes the various factors affecting metal flow. The initial experiments and an exhaustive study of the literature convinced the subcommittee that molten metal at pouring temperatures behaves like a normal fluid and that, therefore, the laws of hydraulics could be applied. From these laws, equations have been derived relating the rate of flow to the shape and size of the gating system.

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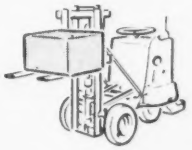

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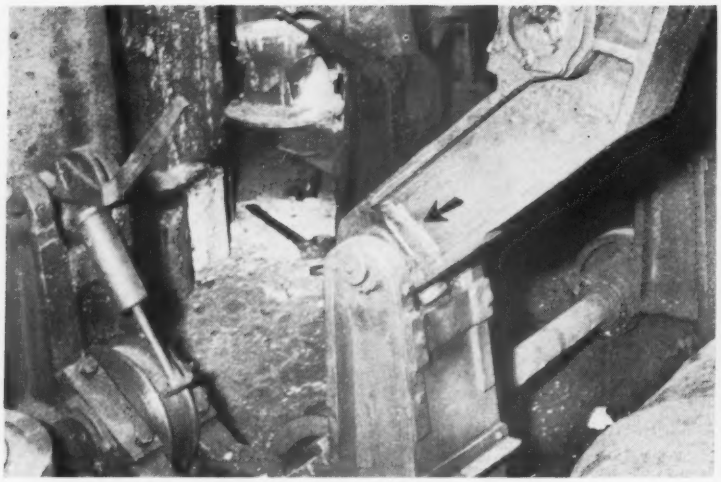
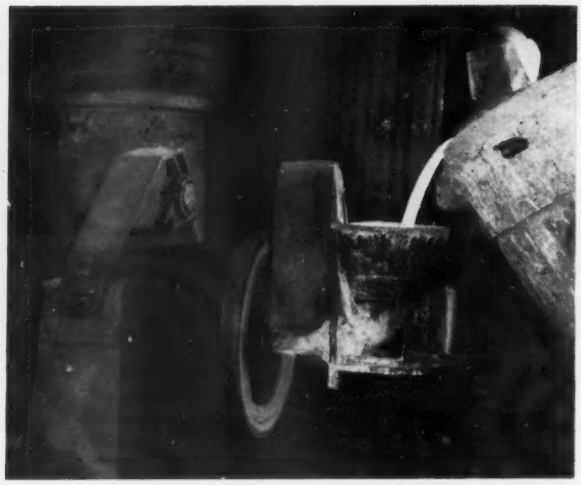


Because of excellent color match, welded joint in rocker arm is almost invisible after three years



Centrifugal casting machine spins at approximately 1200 rpm and holds from 1200 to 1700 lb of metal

Repair Weld Keeps Machine in Service

By H. C. WAUGH and ROY FRANK
International Nickel Co.
New York

SPINNING at 1200 rpm, a loaded centrifugal casting machine exerts terrific pressure on its cast iron rocker arms and supports. If either breaks loose, personnel and property are endangered, the casting will be lost, and a delay of months can be expected before arms and supports can be replaced. Add to this the possibility of being in the middle of a big contract and you have an actual situation that happened in the foundry of a large company about three years ago.

Both the rocker arm that locks over the top of the cylindrical mold or flask and the support to which it is attached snapped off simultaneously.

The spinning flask tore loose and the molten metal started several small fires. Fortunately, there was no injury to personnel.

After considering all the factors, the company welder was consulted and he suggested welding the broken parts with a 55 per cent nickel, 45 per cent iron electrode (Ni-Rod 55).

Before starting to weld, he cleaned the fractured metal with a wire brush and removed the casting skin in the weld area with a grinding wheel. The welder next ground a vee groove between the fractured surfaces with an included angle of about 80 degrees. Then he preheated the arm and support at the break to about 250° F, using an oxyacetylene torch. After deposition of each bead, slag was removed, the bead wire brushed and peened.

He kept the arc length about the same as he would when using a mild steel electrode. Current settings were kept between 120-150 amps ac, and 5/32-in.-diameter electrodes were used. When both arm and support repairs were finished, he placed two 1 in. by ¼-in. steel bands over the top edges of the upright support and welded them in place for additional strength. After the welds had cooled slowly under an asbestos blanket, they were ground flush, making them almost invisible against the base metal.

Upright support to lock rocker arm in place also was welded. The chalk shows break area. Note color match

The company estimates that a new arm and support would have cost $500 and caused a delay of at least six weeks. Instead, it took about eight hours of welding and 20 lb of 5/32-in. electrode to put the machine back in operation. After three years the centrifugal unit is still in regular use.

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ASM Announces Scholarships

For the third consecutive year, the American Society for Metals will award scholarships in metallurgy to 49 leading engineering schools in the United States and Canada. Scholarships are to stimulate interest in metallurgy, with the objective of a greater supply of metallurgical engineers needed by the industry. A total of 129 $400 scholarships already have been awarded through American and Canadian engineering schools having undergraduate degree courses in metallurgy. Scholarship grants are made to the university, which selects recipients.

More and more foundrymen are using *Moly*. They like Moly's 3 Advantages:

ABUNDANT • At Climax's Colorado mine, there's enough molybdenum to supply all the free world's needs for at least 35 years at the present rate of consumption.

EASY TO USE • Moly can be added to most grades of cast iron without changing character of charge, normal melting practice, or the base metal. No balancing is necessary. Moly is neither a graphitizer nor a strong carbide former. Moreover, effective additions are so small they can be made at the spout or in the ladle because the cooling effect on the iron is insignificant.

EFFECTIVE • Moly not only adds strength to a casting but can do more. You can get:

Strength plus toughness

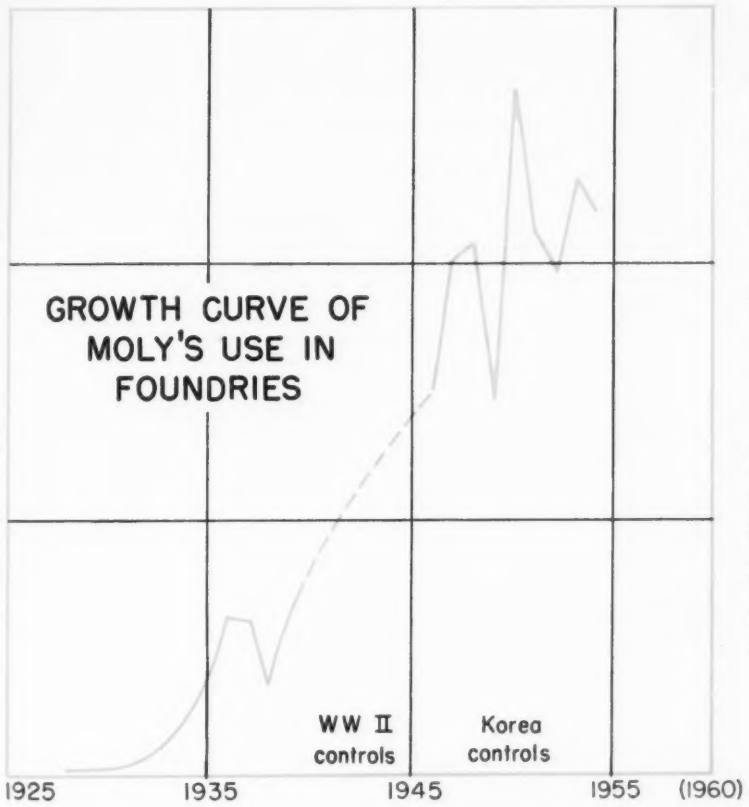
Strength plus growth resistance

Strength plus response to heat treatment

Strength plus wear resistance

Strength plus elevated temperature properties

Strength plus uniformity in heavy and varying sections



For engineered castings — get better results with Moly. If you would like to add your name to our mailing list for a series of leaflets on Moly Iron — address Dept. 20, Climax Molybdenum Company, 500 5th Avenue, New York 36, N. Y. The first leaflet is now ready for you. Write today.

MS5-15

CLIMAX MOLYBDENUM

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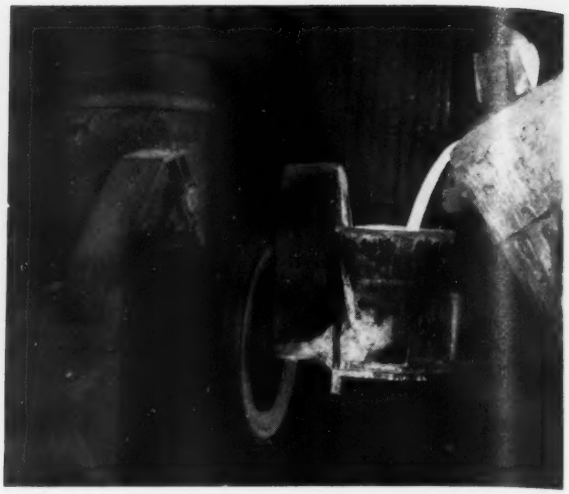

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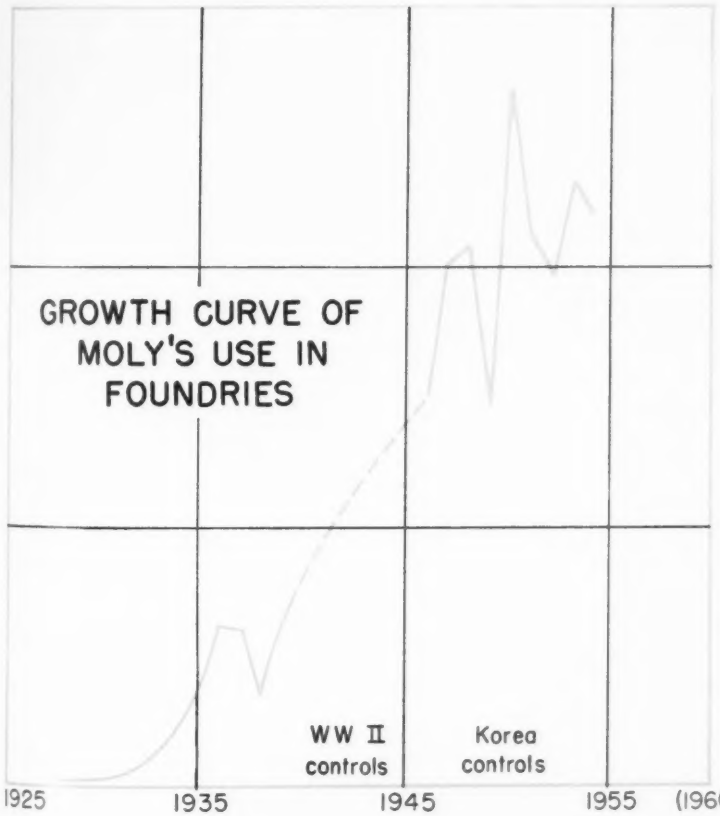

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MS5-15

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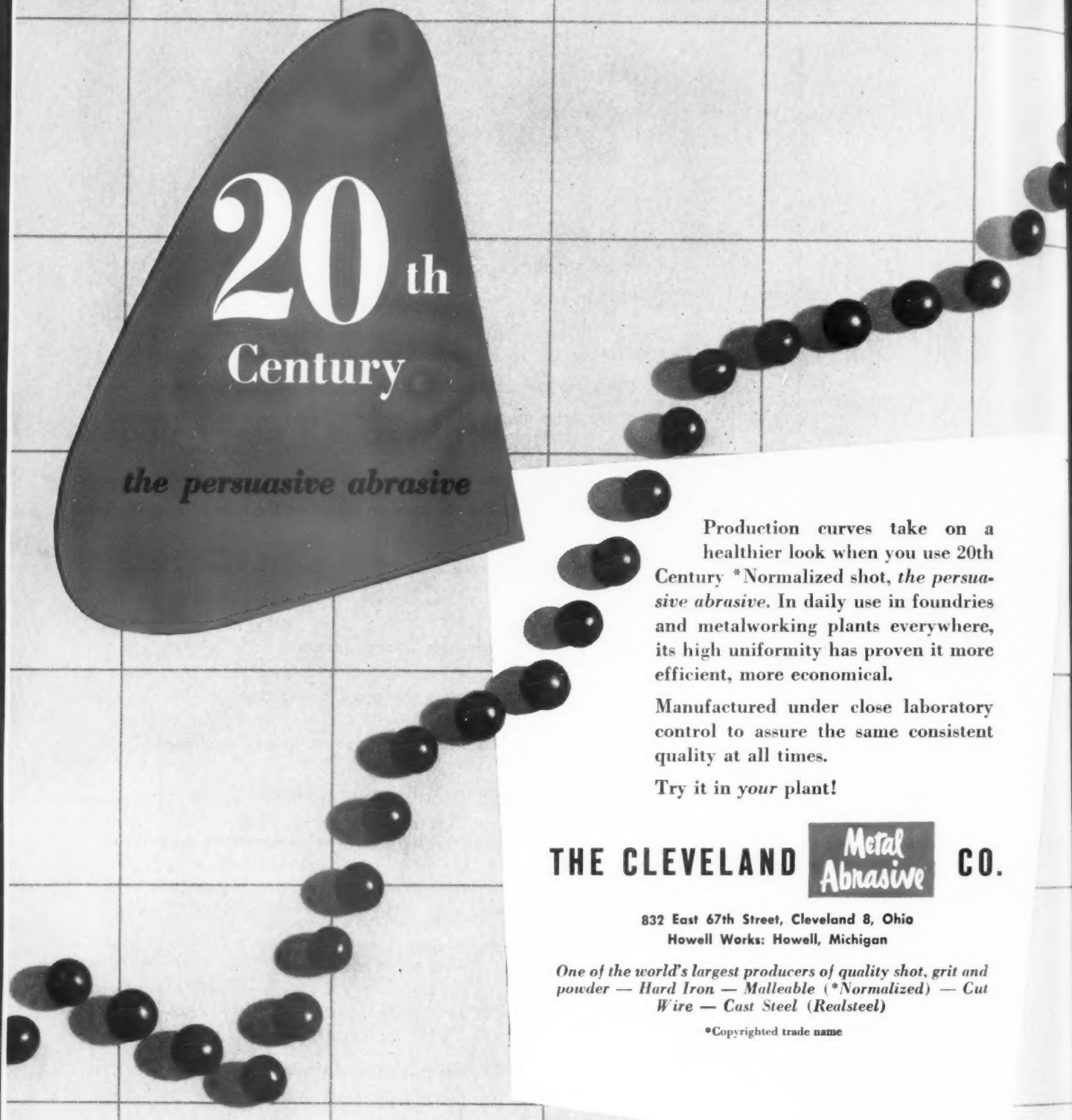

Production curves take on a healthier look when you use 20th Century *Normalized shot, *the persuasive abrasive.* In daily use in foundries and metalworking plants everywhere, its high uniformity has proven it more efficient, more economical.

Manufactured under close laboratory control to assure the same consistent quality at all times.

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THE CLEVELAND Metal Abrasive CO.

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*One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)*

*Copyrighted trade name

Foundry Statistics

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1953	970,506	578,749	.....
1954			
May	67,856	37,306	67,040
5 mo.	366,079	199,591	.....
June	72,820	41,121	60,163
July	50,893	25,243	63,711
Aug.	59,259	34,528	62,494
Sept.	58,015	33,929	66,742
Oct.	64,321	36,956	71,090
Nov.	70,030	41,609	80,686
Dec.	80,599	49,005	85,064
Total	812,016	461,982	.....
1955			
Jan.	82,028	48,000	99,817
Feb.	85,979	48,721	101,766
Mar.	102,364	60,063	99,730
Apr.	101,226	57,397	104,091
May	98,397	57,317	106,446
5 mo.	469,994	271,498	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1953	658,022	214,553	200,025	239,330	.....
1954					
May	47,663	12,461	16,312	18,368	83,848
5 mo.	259,512	70,396	87,875	98,842	.....
June	48,061	12,442	17,105	17,886	79,126
July	39,636	11,299	13,749	14,004	76,513
Aug.	42,429	11,252	15,335	15,213	76,684
Sept.	46,249	10,717	16,641	18,228	79,873
Oct.	53,901	12,765	19,238	21,245	88,518
Nov.	55,224	12,934	20,396	21,296	94,491
Dec.	64,045	13,753	23,629	26,017	99,556
Total	609,057	155,558	213,968	232,731	.....
1955					
Jan.	64,414	13,358	23,679	26,819	102,382
Feb.	66,869	13,579	24,319	28,234	108,939
Mar.	78,958	16,019	29,029	33,229	110,046
Apr.	73,049	14,041	28,028	30,208	109,156
May	71,733	14,277	25,597	31,243	105,014
5 mo.	355,023	71,274	130,652	149,733	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[2]
1953	990,496	888,369	61,316	.....
1954				
May	67,859	61,469	3,755	31,568
5 mo.	357,525	318,786	22,971	.....
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,276	63,855	3,619	30,296
Nov.	70,020	63,065	4,089	27,508
Dec.	72,421	65,159	4,346	31,954
Total	834,557	751,804	48,849	.....
1955				
Jan.	72,233	64,540	4,678	30,864
Feb.	75,253	67,768	4,598	37,520
Mar.	92,149	83,149	5,649	42,940
Apr.	84,183	75,903	5,152	51,111
May	85,024	76,080	5,513	49,211
5 mo.	408,842	367,440	25,590	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments—Total	For Sale	Unfilled Orders[2]
1953	34,517	31,469	.....
1954			
May	1,738	1,541	7,522
5 mo.	10,858	9,601	.....
June	2,034	1,820	8,296
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,092	1,876	7,294
Nov.	2,161	1,906	6,867
Dec.	2,287	2,031	6,678
Total	25,572	22,745	.....
Jan.	2,305	2,067	7,236
1955			
Feb.	2,160	2,009	7,376
Mar.	2,572	2,311	7,011
Apr.	2,633	2,405	6,800
May	2,400	2,174	6,530
5 mo.	12,070	10,966	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	May 1955	Apr. 1955	May 1954
Ferrous	210,100	205,300	184,900
Nonferrous	71,200	71,400	59,300

Average Weekly Earnings

Gray Iron	85.97	83.56	72.56
Malleable Iron	88.10	84.60	72.01
Steel	85.90	85.08	73.48
Nonferrous	85.90	83.84	79.00

Average Weekly Hours

Gray Iron	43.2	42.2	38.8
Malleable Iron	43.4	42.3	37.7
Steel	41.3	41.1	37.3
Nonferrous	41.1	40.5	39.5

Labor Turnover Rate (May)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.8	4.1	2.8	0.6
Malleable Iron	5.2	3.6	2.4	0.2
Steel	5.7	3.1	1.6	0.7
Nonferrous	3.5	3.8	1.9	1.2

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

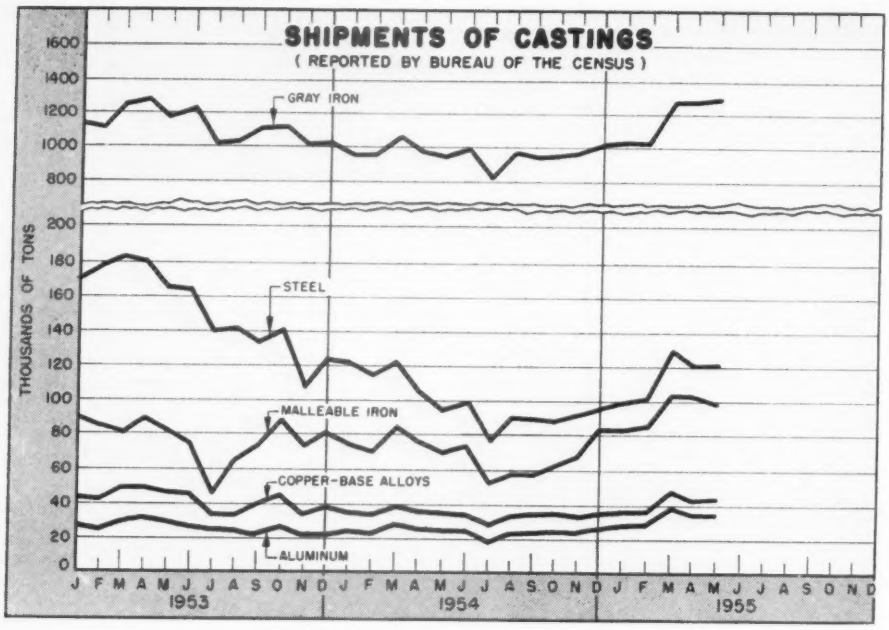
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Pressure Pipe & Fittings—Total[3]	Soil Pipe & Fittings—Total[3]	Unfilled Orders[2]
1953	13,707,902	7,494,843	8,449,837	3,675,454	2,829,159	1,389,483	467,142	1,285,598	677,166	.....
1954										
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	122,514	65,453	775,278
5 mo.	4,853,825	2,578,340	3,161,623	1,306,853	713,580	310,378	151,015	535,394	292,226	.....
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
Aug.	934,644	541,904	569,790	250,702	140,165	69,897	29,134	127,255	68,300	829,505
Sept.	921,232	533,909	559,934	248,124	139,679	68,053	25,374	124,821	71,424	810,654
Oct.	942,934	552,022	570,365	253,802	150,282	79,191	23,599	130,326	68,362	789,117
Nov.	997,301	547,447	623,390	258,933	167,983	85,703	25,723	118,480	61,725	759,613
Dec.	1,074,258	563,699	680,700	276,045	200,044	97,936	27,229	111,082	55,203	744,633
Total	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,721	.....
1955										
Jan.	1,091,923	563,153	712,097	282,386	192,132	97,007	25,783	100,638	61,273	782,656
Feb.	1,106,165	578,171	720,304	291,675	196,118	99,794	27,401	95,285	67,057	852,168
Mar.	1,314,918	688,733	847,874	334,287	217,571	109,681	36,732	129,746	82,995	934,224
Apr.	1,293,678	679,867	819,872	319,149	216,116	108,490	35,415	145,871	76,404	966,057
May	1,310,424	707,105	803,897	315,072	227,236	117,915	35,966	168,772	74,553	937,949
5 mo.	6,117,108	3,217,029	3,904,044	1,542,569	1,049,173	532,887	161,297	640,312	362,325	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon—Total	Carbon—For Sale	Carbon—Railway Specialties	Alloy—Total	Alloy—For Sale	Alloy—Railway Specialties	Unfilled Orders[2]
1953	1,834,197	1,400,013	321,010	1,276,729	959,493	293,491	557,468	417,148	27,519	.....
1954										
May	94,610	70,596	9,454	64,546	46,768	8,342	30,064	22,945	1,112	182,502
5 mo.	561,986	423,897	74,304	387,235	287,083	67,266	174,751	137,515	7,856	.....
June	100,022	72,881	8,639	69,021	48,370	7,552	31,001	24,554	1,087	169,594
July	75,848	53,207	5,815	50,453	33,461	4,964	25,395	19,746	851	170,567
Aug.	89,590	66,792	9,844	61,344	44,236	8,148	28,256	22,556	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,987	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	24,132	984	154,079
Nov.	87,659	64,812	7,742	56,057	40,085	6,624	31,602	24,727	1,118	175,715
Dec.	93,547	69,843	12,489	62,967	45,632	10,469	30,841	24,211	1,020	179,148
Total	1,184,096	880,158	135,581	802,821	580,474	120,309	381,285	303,428	15,090	.....
1955										
Jan.	98,238	75,044	13,809	67,397	49,816	12,762	30,841	25,228	1,047	201,839
Feb.	106,430	80,729	16,501	74,709	55,014	15,381	38,945	25,715	1,120	202,301
Mar.	127,460	98,926	19,339	88,867	68,013	17,887	34,933	30,913	1,452	215,059
Apr.	120,053	92,237	16,646	84,247	63,244	15,163	35,806	28,993	1,483	221,336
May	122,465	92,713	16,810	85,950	63,182	15,335	36,515	30,161	1,475	225,302
5 mo.	574,646	439,649	83,105	401,170	299,269	76,528	177,040	141,010	6,577	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

FOUNDRY STATISTICS



COMMERCIAL HEAT TREATING

(National Billings of Metal Institute Members)

	1953		1954		1955	
	No. Reporting	Total Reported	No. Reporting	Total Reported	No. Reporting	Total Reported
Mar.	52	2,924,713	59	2,345,010	63	2,500,000
Apr.	55	2,904,736	60	2,179,445	62	2,452,500
May	56	2,819,628	62	1,871,175	62	2,516,300
June	51	2,591,154	61	1,996,770	62	2,488,800
6 mo.		16,767,981		12,883,911		14,164,400
Annual total		31,733,067		24,244,368		.....

COKE PRODUCTION AND CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1953	78,467,806	78,227,414	2,915,420
1954			
May	4,802,245	4,656,950	204,958
5 mo.	25,343,613	24,964,326	1,080,781
June	4,610,064	4,683,726	194,664
July	4,618,665	4,555,701	170,617
Aug.	4,510,603	4,501,477	195,344
Sept.	4,490,603	4,434,650	191,607
Oct.	5,082,374	5,100,135	208,418
Nov.	5,230,237	5,283,916	221,391
Dec.	5,610,564	5,615,228	217,104
Total	59,526,723	59,139,159	2,479,926
1955			
Jan.	5,805,926	5,862,113	234,784
Feb.	5,394,166	5,519,241	242,282
Mar.	6,235,909	6,306,723	286,072
Apr.	6,135,645	6,164,459	278,242
May	6,425,213	6,569,069	277,968
5 mo.	29,996,859	30,421,605	1,319,348

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1954	1955
Jan.	20,661	25,201
Feb.	19,920	25,349
Mar.	23,653	29,713
Apr.	24,746	27,641
May	22,269	23,708
June	22,348	23,141
July	17,074	.....
Aug.	21,684	.....
Sept.	22,464	.....
Oct.	24,080	.....
Nov.	23,061	.....
Dec.	21,273	.....
Total for year	263,233	.....

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds)

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1953	521,253	349,022	.....
1954			
May	36,793	23,671	46,726
5 mo.	214,998	137,294	.....
June	40,708	26,890	47,537
July	28,306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25,617	56,006
Oct.	39,072	27,337	64,500
Nov.	48,437	35,207	62,750
Dec.	54,410	35,211	69,403
Total	434,785	295,587	.....
1955			
Jan.	58,586	35,472	70,691
Feb.	58,585	35,893	73,858
Mar.	71,811	44,048	81,363
Apr.	71,595	45,477	81,756
May	63,735	38,124	74,472
5 mo.	324,312	199,014	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1954	1955
Jan.	173.8	81.0
Feb.	99.9	90.4
Mar.	82.7	163.6
Apr.	125.3	178.6
May	80.8	145.7
June	86.1	186.8
July	68.8	....
Aug.	75.6	....
Sept.	68.3	....
Oct.	147.5	....
Nov.	61.4	....
Dec.	113.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons[1])

	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1953	69,005,976	9,676,463	1,026,334	8,263,880
1954				
Apr.	4,582,862	748,766	79,183	518,048
4 mo.	18,180,159	2,948,165	299,985	2,003,381
May	4,776,603	710,159	67,368	506,582
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420,564
Aug.	4,164,703	671,631	65,336	486,596
Sept.	4,298,495	675,593	68,860	500,349
Oct.	4,782,488	710,127	67,678	528,432
Nov.	4,928,850	737,286	71,844	573,298
Dec.	5,075,563	798,435	82,910	566,223
Total	54,780,758	8,542,581	855,207	6,100,444
1955				
Jan.	5,416,052	813,682	90,622	614,824
Feb.	5,350,452	823,465	91,916	577,296
Mar.	6,313,717	993,266	113,198	727,401
Apr.	6,239,036	975,751	108,965	726,138
4 mo.	23,319,257	3,606,164	404,701	2,645,659

PIG IRON PRODUCTION AND CONSUMPTION

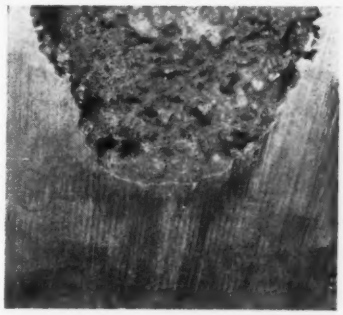
	Production[1] (standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption[2] (By type of furnace—gross tons) Total	Cupola	Air	Electric
1953	74,879,511	2,599,307	3,736,431	60,465,016	8,347,825	66,637,364	4,918,480	272,311	164,267
1954									
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,198
6 mo.	28,908,067	1,039,832	1,499,049	23,625,693	2,743,493	26,102,795	2,223,412	117,797	78,806
July	4,590,076	182,130	182,527	3,790,999	434,420	3,990,431	293,926	12,258	13,317
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	4,013,552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	4,005,578	346,698	16,984	11,654
Oct.	4,937,436	212,237	248,643	3,979,437	497,119	4,518,770	367,063	16,186	11,307
Nov.	5,201,446	202,824	263,484	4,233,253	504,885	4,764,215	375,526	16,178	15,932
Dec.	5,526,720	229,717	259,423	4,510,772	526,808	4,978,200	403,726	19,829	13,917
Total	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4,364,418	215,158	155,258
1955									
Jan.	5,729,404	213,608	272,451	4,703,875	509,470	5,202,360	409,281	18,874	20,016
Feb.	5,394,585	209,852	252,860	4,425,080	506,793	4,964,515	409,141	20,576	22,551
Mar.	6,406,902	221,437	359,413	5,239,116	586,936	5,830,943	480,639	24,066	15,931
Apr.	6,329,927	210,085	305,188	5,068,506	746,148	5,725,258	467,709	21,536	12,857
May	6,753,236	246,661	342,544	5,385,299	778,732	.....	.....	.....	.....
June	6,494,838	238,412	347,631	5,245,861	662,934	.....	.....	.....	.....
6 mo.	37,108,892	1,370,055	1,880,087	30,067,737	3,791,013	.....	.....	.....	.....

[1]Source: U. S. Dept. of Interior, Bureau of Mines. [2]Source: American Iron & Steel Institute. [3]Source: Bureau of the Census. [4]For sale only.

USITE

is an efficient insulator for maintaining the temperature of metal in hot tops, risers and transfer ladles.

Typical Depression Cast Steel Riser



Typical Depression Steel Ingot

When used "pound for pound" in comparison with other hot top insulators, it will give

GREATER YIELD WITHOUT CONTAMINATION at LESS COST.

HERE ARE THE REASONS WHY:

- **USITE** is a fine powder, and therefore spreads readily.
- **USITE** is free of graphite and other forms of carbon soluble in molten steel.
- **USITE** is chemically inert, and will not contaminate the melt.
- **USITE** does not affect the carbon content of the steel.
- **USITE** promotes the formation of flat shrinkage in the head.
- **USITE** keeps the metal fluid in the hot top or riser.
- **USITE** prevents the formation of secondary pipe.

Manufactured in the U.S. from domestic materials, USITE is shipped in non-returnable barrels containing approximately 500 lbs. Other USITE products are: USITE HOT TOP BLANKET, guaranteed free from graphite; USITE TYPE F-1, (EXOTHERMIC), for steel ingots, cast steel risers and gray iron risers. A test in your own plant will convince you of the superior qualities and economies of USITE. Our technical staff will be glad to answer any chemical or metallurgical questions involving our products.

For PACK HARDENING and BOX ANNEALING, use

ANNEEL-PAK

Guaranteed free of graphite, it flows like red hot rain at 2100°. Has a very fast rate of convection.

- **NO** trapped air
- **NO** voids or fuseing
- **NO** gas, fumes or flame
- **NO** recarburization
- **NO** decarburization
- **NO** adherence to parts
- **NO** solidifying
- **NO** gumminess, shrinkage

All BARCO products licensed under 8 patents. Other patents pending.

Barium & Chemicals, Inc.

WILLOUGHBY, OHIO

USE BARCO PRODUCTS

Territorial distributors wanted in United States and Canada.

MANUFACTURERS OF Metallic Manganese Sulphide; Barium, Strontium, Manganese and Calcium Products; Carbonate-oxide-hydrate-hydroxide-peroxide-chloride-chromate-sulphide-sulphate-oxalate-thiusulphate-fluoride-acetate-nitrate-hydrogen peroxide-anti-scumming dust-Barium "XA" and special formulas compounded to order.

ACTIVITIES

of Foundry Groups

Wisconsin: Annual outing of the AFS chapter was held in July at Merrill Hills Country Club near Waukesha, Wis., with about 600 members and guests attending. Evening program was highlighted by an Aqua-Cade show in the club's pool. More than 50 valuable prizes were awarded holders of lucky tickets as well as to the winners of various contests held throughout the day. Over 100 foundry supply houses and others in the region donated the prizes.

One of the contests which attracted the most interest was that of guessing the total weight of a number of castings of different sizes and compositions. Winner came within a few ounces of the correct weight.

Golf committee consisted of the following: Don Gerlinger, chairman; E. Sadek, co-chairman, B. H. Booth, J. G. Risney, N. N. Amrhein, C. A. Gehrman, C. W. Schwenn, H. A. Zielbell, K. O. Johnson, H. F. Runkel and J. A. Westover.—*John E. Hubel*

Northeastern Ohio: Ohio chapters of the American Foundrymen's Society and Case Institute of Technology are co-sponsors of the seventh Ohio Regional Foundry Conference to be held on the Case campus in Cleveland, Oct. 20-21.

Under the theme, "Better Castings for Better Living," the conference includes papers on research, shell molding, safety, the CO_2 process, high-pressure molding, patternmaking, the use of exothermic and insulation materials, and foundry practices in producing gray iron, steel, malleable iron and nonferrous castings.

The welcome address will be by T. Keith Glennan, Case president. P. R. Reid, director of civic affairs office, Ford Motor Co., Detroit, will speak at the banquet Thursday, Oct. 20. A speaker from national headquarters will discuss AFS activities at the Thursday luncheon, and R. Clark, Ohio Bell Telephone Co., Cleveland, will present new ideas in communications at the Friday luncheon.

Alexander D. Barczak, Superior Foundry Inc., Cleveland, is convention chairman. Registration is under the direction of Norman J. Stickney, Sand Products Co., Cleveland.—*Robert H. Herrmann*

Chicago: Rain took principal honors at the annual stag outing of the AFS chapter on Saturday, Aug. 6. Precipitation dampened the enthusiasm of golfers and reduced total attendance as only slightly more than 650 chapter members and guests turned out for the event at Lincolnshire Country Club in Crete Township, Ill.

But despite the intermittent downpours, for some 320 golf was the principal activity. Between showers, horseshoe pitchers managed to conduct their customary contest.

Throughout the day, the annual weight guessing contest was staged and in it Spencer S. Phillips, foundry research engineer, Manufacturing Research, International Harvester Co., emerged with the laurels in a nearly perfect performance. The aggregate weight of four castings, one each of aluminum, steel, gray iron and brass, was 72 lbs. 11 oz. The guess of Mr. Phillips was only 2 oz. short of this.

A deluxe buffet dinner was served family style in the big tent adjacent to the club house. Prizes to golf and horseshoe winners and a fine assortment of door prizes were distributed following dinner. Several floor show acts concluded the day's activities.

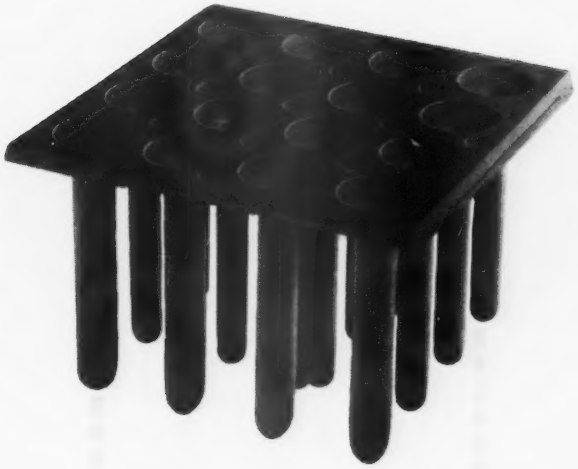
The outing was arranged and directed by the chapter's entertainment committee headed by W. C. Kremer, Foundry Products Division, Archer-Daniels-Midland Co., and co-chairmanned by David Matter, Manufacturing Research, International Harvester Co.

Members of the committee included J. C. Mulholland, Pettibone Mulliken Corp.; J. S. Groh, Manley Sand Co.; A. A. Milkie, Pangborn Corp.; J. C. Becker, Hewitt-Robins Inc.; George Bowdish, Hill & Griffith Co.; R. W. Meloy, Link-Belt Co.; J. Absalom, American Steel Foundries; and C. A. Legg, Wisconsin Steel Co.—*Erle F. Ross*

OREGON: New officers of the Oregon and Oregon State College student chapters of the AFS are pictured above. In the right view, left to right, are officers of the student chapter: Herbert Singleton, treasurer; Palmer Byrkit, vice president; Bud Banks, president, and Stanley Rabe, secretary. Officers of the AFS chapter for 1955-56 are shown in left view, left to right: Norman E. Hall, Electric Steel Foundry Co., director; Fred Menzel, Rich Mfg. Co., program chairman; Harry Czezewski, Metallurgical Engineers Inc., chairman; Harry McAllister, Western Foundry Co., secretary-treasurer and Robert M. Burns, Pacific Chain & Mfg Co., director. Photos by courtesy Bill Walkins, Electric Steel Foundry Co.

ACME RESIN

PlastiSand PROCESS



Resin formulation and the coating process covered by Patents Pending

Shell molding foundries are discovering the fact that when the PLASTISAND Process, using liquid-resin coated sand, is employed—DUST IS ELIMINATED. This feature alone makes the process invaluable because of the safety and health factor. The absence of dust means healthier working conditions, safer, cleaner factories. No irritating resin dust fumes, danger of dust explosion is eliminated—plant efficiency is increased.

In the PLASTISAND Process—each grain of sand is uniformly coated with partially polymerized thermosetting resin. Permanent, even distribution of the liquid resin throughout the sand results in smoother finishes and higher strengths.

PROVED SAVINGS, Too!

1. The PLASTISAND Process, a totally new development by Acme Resin Corporation in the relatively new field of foundry shell molding, assures savings—because of a shorter dwell, and a faster cure—shorter time on the pattern and a faster baking cycle.
2. You can be certain of superior molds with as little as *one-half* the resin content formerly necessary with dry resin.
3. Hot or cold mulling—adaptable to dump-box, roll-over and blowing of either shells or cores.
4. **SUPERIOR TENSILE STRENGTH**—PLASTISAND molds have greater cold strength, a factor gaining importance as new stack pouring techniques are developed.
5. **NON-SEGREGATING**—Each grain of sand is completely, uniformly coated with liquid phenolic resin in the PLASTISAND Process—segregation cannot occur.
6. **EXCELLENT HOT STRENGTH**—The hot strength of PLASTISAND molds is equal or superior to that obtained by the use of dry-resin sand mixes.
7. **GREATER PRODUCT UNIFORMITY**—Because it is non-segregating, resin-coated sand prepared by the PLASTISAND Process yields almost identical molds, batch after batch.

An informative booklet has been prepared to better acquaint the foundry industry with the new PLASTISAND Process. It may be obtained by writing to the ACME RESIN CORPORATION at the address listed below right.

80-POWER MAGNIFICATION OF RESIN-COATED GRAINS OF SAND.

ACME RESIN CORPORATION
1401 CIRCLE AVENUE • FOREST PARK, ILLINOIS

Obituary

HOMER BRITTON, 61, vice president, Cleveland Foundry Co., Cleveland, died July 15. Mr. Britton joined the company, the former Cleveland Co-Operative Stove Co., in 1915, became foundry manager in 1919, and had been vice president since 1939. He was treasurer of the Gray Iron Founders' Society from 1945 to 1947 and a member of the Northeastern Ohio Chapter of the AFS.

* * *

John H. Collier, 70, former president and board chairman, Crane Co., Chicago, died July 27 at his home in Fairfield, Conn., where he had lived since retiring in 1951. After specializing in civil engineering at Purdue University, Mr. Collier joined Crane Co. in 1903, became vice president-manufacturing in 1933, president in 1941, and board chairman in 1946.

* * *

John D. Hysong, 52, Chicago district sales manager, Basic Refractories Inc., Cleveland, died July 23. He attended University of Pittsburgh and joined Basic Refractories in 1942 as service engineer, after serving in various capacities in the steel field.

* * *

Paul E. Riedel, 62, former owner of Production Pattern Co., Milwaukee, died Aug. 4. The firm, which discontinued business early this year supplied foundries with wood and metal pattern equipment.

* * *

Howard C. Teetor, 82, who with his four brothers founded Perfect Circle Corp., Hagerstown, Ind., died July 10, in Indianapolis. Mr. Teetor was associated with the company from 1895 until his retirement in 1927.

* * *

Harold E. Hall, 45, since 1943 president and a director of Metals Disintegrating Co., Elizabeth, N. J., died July 8. He attended Columbia University, leaving to join the company which his father founded in 1916.

* * *

Peter J. Soffel, 63, founder and president, Pittsburgh Metals Purifying Co., Pittsburgh, died July 9. Mr. Soffel was associated with the Basic Mineral Co., Pittsburgh, prior to forming his own company in 1927.

* * *

Francis A. Smith, 60, president, the Die-Cast Products Inc., Cleveland, died Aug. 2. He was vice president-general manager of Fairmount Tool & Forging Inc., Cleveland, until he joined Die-Cast about 1950.

* * *

F. J. Stokes, 81, founder and board chairman of the F. J. Stokes Machine Co., Philadelphia, died Aug. 1. He was president of the company for 53 years before being named chairman in 1948.

* * *

Richard Sees Jr., 43, formerly associated with his father, the late Richard Sees Sr., in operation of Capitol Brass Foundry, Albany, N. Y., died June 21, in Glendale, Calif.

* * *

Howard E. Johnson Sr., 53, chief engineer, American Manganese Steel Division, American Brake Shoe Co., Chicago Hgts., Ill., died July 24.

* * *

Harold L. Martin, vice president-general manager, Atlas Foundry & Mfg. Co., Richmond, Calif., died June 29.

Robert E. Kennedy, AFS Secretary Emeritus, Dies

ROBERT E. KENNEDY, 68, secretary emeritus of the American Foundrymen's Society and a retired assistant professor of University of Illinois, died Aug. 7 in Westville, Ind. where recently he made his home.

A native of Vincennes, Ind., Mr. Kennedy was graduated in foundry practice from Winona Technical Institute, Winona, Ind. Later he received a degree in industrial education from University of Illinois, Urbana, Ill., where he spent a number of years and was assistant professor of foundry practice. During World War I he served with the Ordnance Department and was assigned to the steel foundry at Watertown Arsenal, Watertown, N. Y., and Aberdeen Proving Grounds, Aberdeen, Md.

ROBERT E. KENNEDY

In 1921 Mr. Kennedy became associated with the American Foundrymen's Society as assistant secretary. In 1925 he was made technical secretary, and in 1938, secretary. When the office of executive vice president was combined with that of secretary in 1943, he became administrative head of the association. Retiring from active participation with the American Foundrymen's Society in 1945, he was named secretary emeritus by the board of directors.

As technical secretary Mr. Kennedy had much to do with the development of research and technical committee activities of the society. He was instrumental in establishing the first sand research project, in developing the first *Cast Metals Handbook*, and in furthering co-operative work with other technical societies interested in the field of castings.

Following his retirement from the AFS, Mr. Kennedy in 1946 was placed in charge of foundry and pattern shop instruction work being conducted by University of Illinois at its newly established Chicago branch on the Navy Pier. In 1952 he was given the title of assistant professor by the university, recovering his previous academic rank held during the 20's when he was teaching foundry practice at Urbana. Mr. Kennedy retired last year from his teaching duties.

In 1945 Mr. Kennedy was awarded the Joseph F. Seaman Medal of the AFS for his outstanding contributions to the field of foundry practice in the industry. Last year the Chicago Chapter of the AFS established the Robert E. Kennedy Scholarship Fund at the Chicago Undergraduate Division of the University of Illinois, as a tribute of affection for its long-time member who devoted so many years of his life to educational aspects of the foundry industry. At the Alumni Group dinner during the 59th annual AFS convention in Houston, Tex., May 23-27, by unanimous vote Mr. Kennedy was elected to be secretary of the group.

Schmieg DUST and FUME Eliminators

CENTRI MERGE

SET HIGHER STANDARD of EFFICIENCY in NEW EASTERN AUTOMOTIVE FOUNDRY

This Schmieg 8000 CFM Vertical Rotor Unit, with sluice type bottom, is used for exhausting a shot blast cabinet.

Six 24,000 CFM Schmieg Vertical Rotor Units with continuous sluicing tanks, used for exhausting foundry cleaning room equipment, such as tumbling mills, snag grinders, and shot blast machines.

Pictured here are only some of the very latest SCHMIEG Centri-Merge dust elimination units in a new ultra-modern automotive foundry in the eastern part of the United States.

This completely automatic equipment was engineered, fabricated, and installed throughout this new modern foundry by SCHMIEG to provide maximum safe working conditions and was approved by local and state authorities.

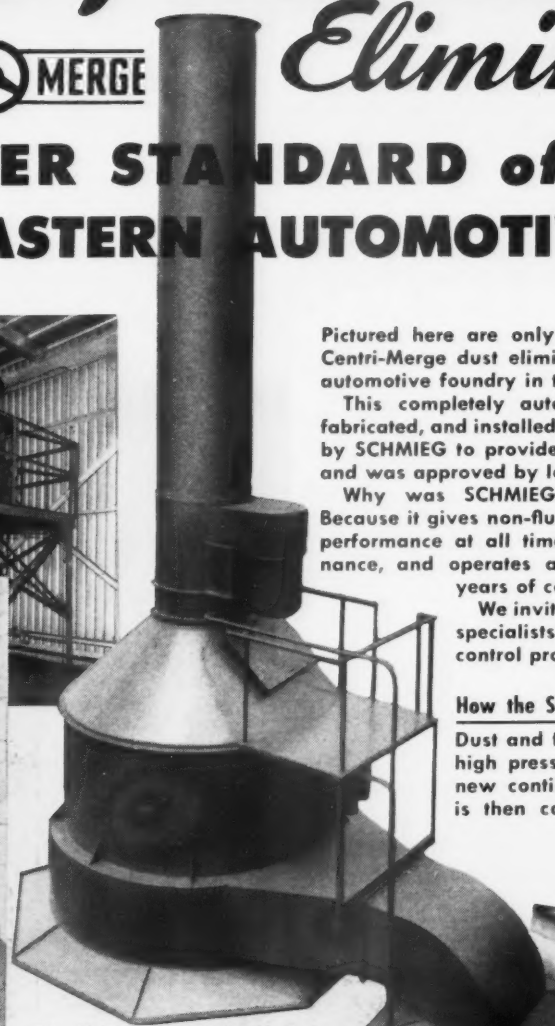
Why was SCHMIEG Centri-Merge equipment chosen? Because it gives non-fluctuating high efficiency air cleansing performance at all times, requires a minimum of maintenance, and operates at peak efficiency throughout many years of constant use.

We invite you to call in SCHMIEG engineering specialists and discuss the dust and fume control problem in your plant.

How the SCHMIEG Vertical Rotor Unit* operates

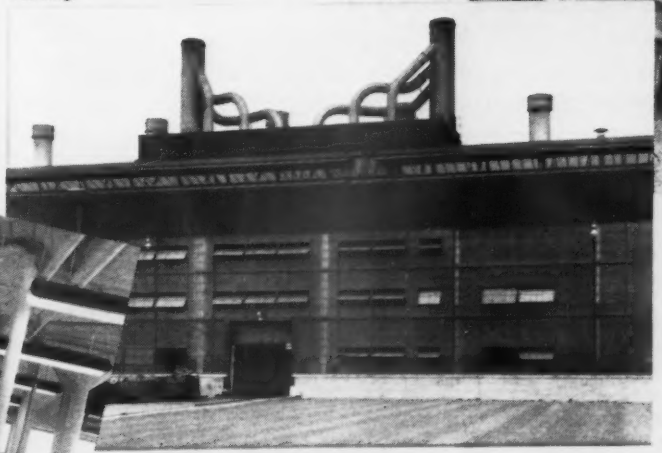
Dust and fumes are separated from the air by high pressure water action for disposal by a new continuous sluicing system. The effluent is then conveyed to a central settling tank.

*U.S. Patent No. 2527015 Canadian Patent No. 469008 with other patents applied for.



This 30,000 CFM Schmieg Vertical Rotor Unit with stack fan is used for exhausting a shot blast machine. Top half of the unit is above the roof, with sluicing bottom located inside the building.

A Schmieg exhaust system supplying ventilation for ladle repair and drying operations.



A view of the 84" diameter ⅛" plate stacks located above the foundry fan room. The six fans in photo at the left discharge cleaned air into the stacks.

A Schmieg high efficiency sawdust collector has the dust box above ground level to permit clearance for a dump truck.

A Schmieg exhaust system for pattern woodworking machines. Stubs for additional equipment are provided.

THE best AIR PURGE is CENTRI MERGE

Schmieg INDUSTRIES INC.

Engineers & Manufacturers

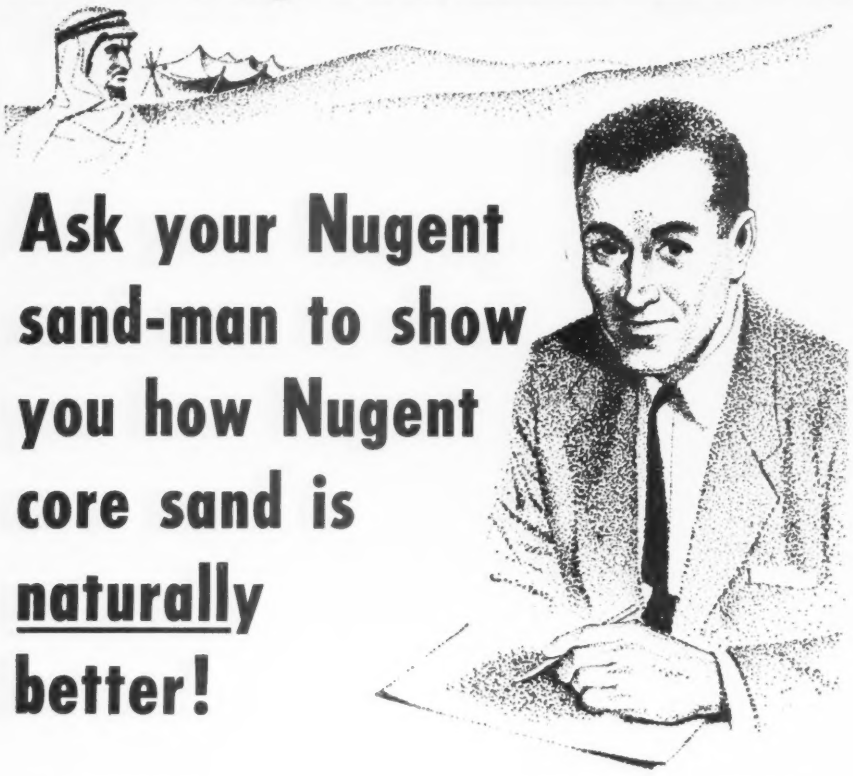
DETROIT, MICHIGAN

P. O. Address: 23930 Sherwood, Center Line, Mich.

See your telephone directory for our representatives in CHICAGO, CLEVELAND, INDIANAPOLIS, NEW YORK, OAKLAND, SACRAMENTO, PHILADELPHIA and MILWAUKEE.

Member of the American Foundrymen's Society—Detroit Chapter

There's a big difference in sands . . .



Ask your Nugent sand-man to show you how Nugent core sand is naturally better!

Put samples of Nugent sand to the test in your sand lab — you'll *see* why it's naturally better! Nugent sand is processed from the best Muskegon dune sand, washed pure by nature for centuries . . . kiln-dried to the correct moisture content, then graded to a uniform AFS grain analysis. This means less core breakage, consistently uniform molds, greater pattern definition and finish, plus freedom from defect-producing components.

5 GRADES OF CERTIFIED SAND

A constant AFS grain analysis of 40, 44, 49, 52 and 55 is maintained through continuous testing with up-to-date laboratory methods. Exacting control processes result in uniform green strength, permeability, moisture, grain distribution, and other characteristics. You get *known* sand quality and unsurpassed uniformity from a source preferred by foundrymen for over 40 years.

See your Nugent sand-man or write direct for proper core sand recommendations. Samples on request.

Represented by —

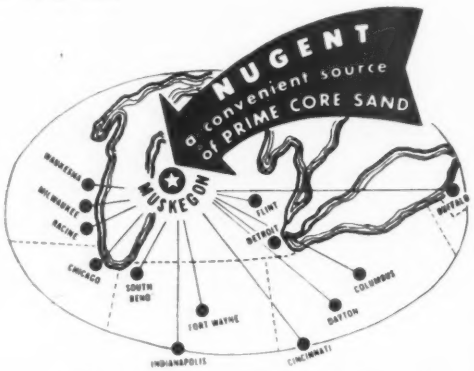
INDIANA PRODUCTS CO.
Kokomo, Indiana

WARNER R. THOMPSON CO.
Detroit 8, Michigan

CARPENTER BROTHERS, INC.
Milwaukee 3, Wisconsin

KEENER SAND & CLAY CO.
Columbus 15, Ohio

GREAT LAKES FOUNDRY SAND CO.
Detroit 26, Michigan



Thanks to Nugent's convenient location, you can count on prompt shipments of sand by 3 main railroads or truck when you need it.

1912 1934 CANNON CORE SAND

Nugent is always ready to serve you with graded sands for the foundry.

THE NUGENT SAND CO., INC.
MUSKEGON, MICHIGAN

National Foundry Association Meets in Chicago, Oct. 6-7

National Foundry Association will hold its 57th annual meeting at the Edgewater Beach Hotel, Chicago, Oct. 6-7. The association's program committee is developing a balanced program intended to appeal to all ranks of management. It will combine discussion on specialized subjects concerning labor and industrial relations with other topics of timely importance.

The tentative program follows:

Thursday, Oct. 6

Morning—"Preparation for Arbitration" by Clarence Updegraff, University of Iowa. "Does Your Contract Permit Productivity."

Luncheon—"Facts of Free Enterprise and the UN" by Alice Widener, publisher and editor, *U. S. A.*

Afternoon—"Outlook in Industries of Major Users of Castings." Business outlook in the farm equipment, automotive and machinery industries as seen by spokesmen of each industry.

Friday, Oct. 7

Morning—"Role of the Foreman in the Foundry." Panel discussion by C. A. Carolin, R. B. Carolin Foundry & Machine Co.; Arthur G. Hall, Nordberg Mfg. Co.; W. E. Jones, Josam Products Co., J. D. McGill, U. S. Pipe & Foundry Co.

Luncheon—"Man in Action—Man in Contemplation" by Dr. Houston Cole, president, Alabama State Teachers College.

Afternoon—"Effect of Recent Automotive Settlements on the Foundry Industry." Panel discussion by Karlton W. Pierce, Ford Motor Co.; Floyd Lawrence, Detroit editor, *Steel*; Robert L. Schutt, City National Bank, Chicago; Joseph Daoust, Morse, Seal & Daoust; James I. Poole, Fairchild, Foley & Sammond.

Steel Founders Establish Gustaf Lillieqvist Award

A lifetime devoted to technical and scientific leadership in the steel castings industry has been recognized and honored by the directors of the Steel Founders' Society of America through the establishment of the Gustaf A. Lillieqvist Steel Foundry Facts Award.

Steel Foundry Facts is a monthly society publication of steel casting technology containing papers by the technical, operating and research men of the industry. The Gustaf A. Lillieqvist Steel Foundry Facts Award will be made annually by the board of directors of the society for the best paper published during the preceding year. An active member of the society until the time of his death on May 31, 1955, Dr. Lillieqvist was a frequent contributor to the publication during his lifetime.

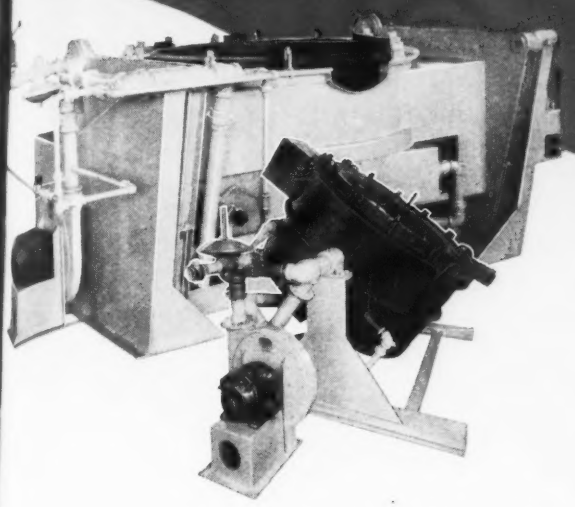
Represents National Engineering

Edwin A. Swensson, co-author of the article "Brass Foundry Modernization Raises Plant Efficiency," presented in the August issue, page 86, is foundry engineer, National Engineering Co., in Detroit. That connection should have been shown in the by-line. National engineered the project.

Get Perfect Pours Faster

Lower Costs WITH STROMAN FURNACES

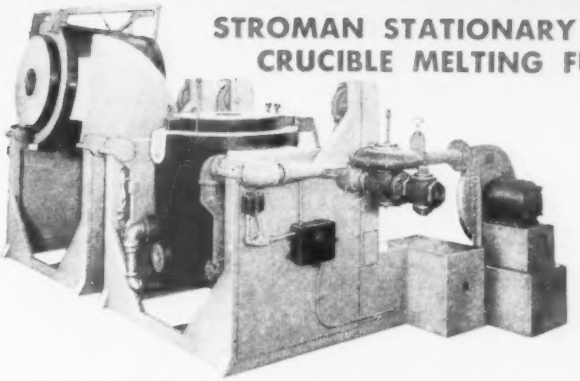
Yes sir, you can bank on Stroman Foundry Equipment to deliver metal the way you want it, when you want it everytime . . . for Stroman are the leaders in design of metal melting furnaces and equipment. For many years they have set the pace in the field, producing the finest furnaces that have effected tremendous economies for foundries, die caster, sand caster and permanent mold plants. They can do the same for you. Get full information . . . write for NEW Bulletin 900 today!



STROMAN TYPE "NL" FURNACES

For Aluminum, Zinc, Lead, Kirksite and other Soft Metals.

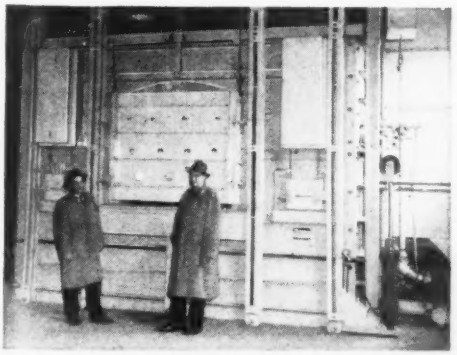
These furnaces have many uses and are particularly efficient when large pieces of metal or bulky scrap is to be remelted. The iron pots have a large diameter and a comparatively shallow bath. Available in choice of Hand Tilt or Hydraulic Tilt with Stationary Lip Pour.



STROMAN STATIONARY LIP POUR CRUCIBLE MELTING FURNACE

For Brass, Bronze, Aluminum and other non-ferrous metals. Capacities from No. 60 to No. 1000 Crucible.

These furnaces with Stationary Lip Pour that assures a constant pouring arc meet specific needs in handling various metals for the foundry, permanent mold, die casting plants and rolling mill. It is ideal for use with monorail or dolly ladle for large quantities of metal. Eliminates spillage and waste.



STROMAN LARGE SIZE REVERBERATORY FURNACES

For melting unlimited capacities of Aluminum, Zinc or Brass.

Excellent for Smelting, Extrusion Work, Die Casting, Permanent Mold and Foundry Melting. Built to meet your particular melting problem. Now in use in many of the largest manufacturers of castings.

STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Sturdy, efficient and featuring the Stroman Push-Back Cover these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 crucible.

STROMAN FOUNDRY EQUIPMENT

- **Oil Burners**

For ordinary or extremely high temperatures. A type built for every purpose.

- **Centrifugal Blowers**

Precision fabricated to deliver combustion air in any desired pressure or volume.

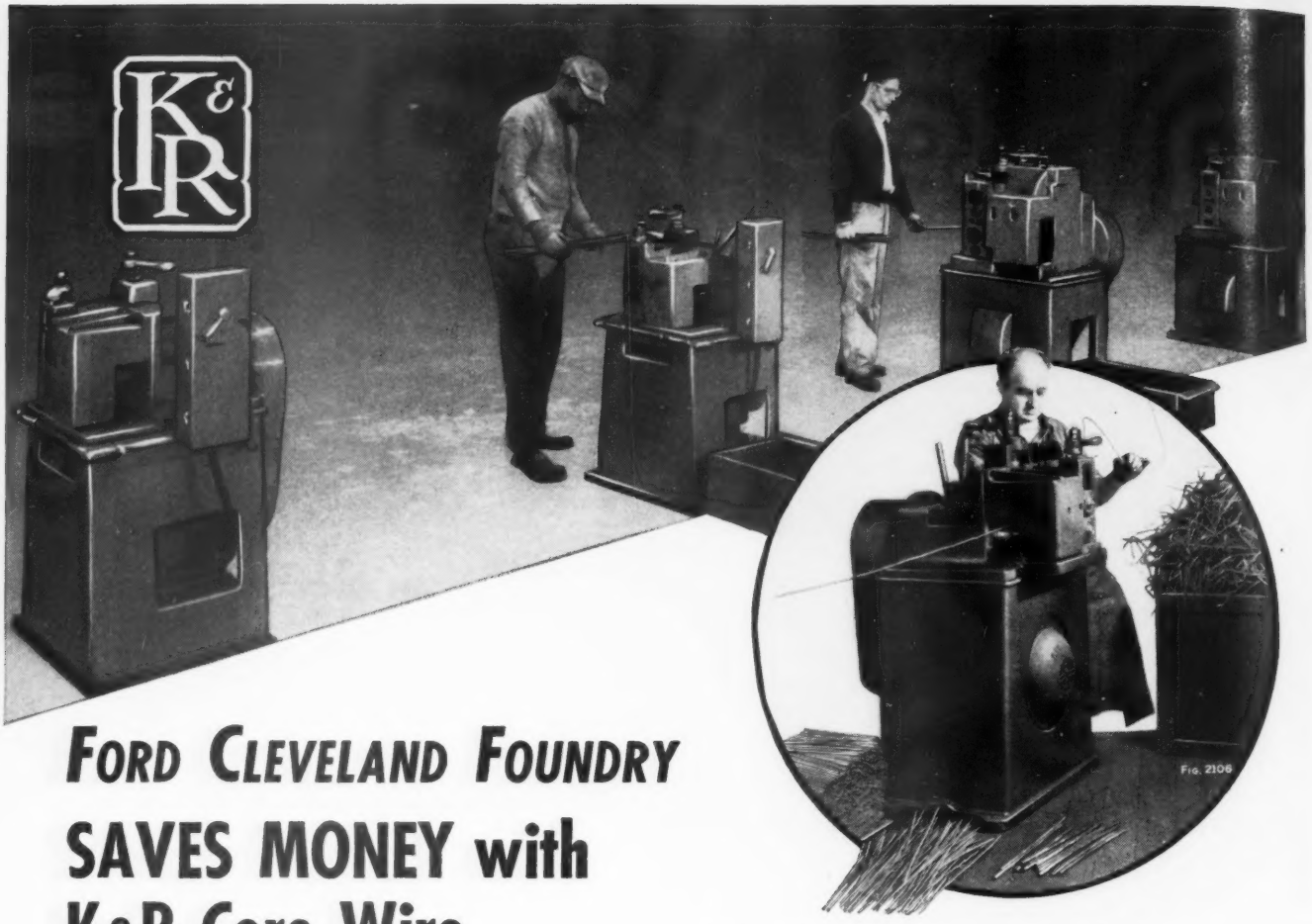
- **Oil Pumping Units**

Come complete, ready to hook into your heating system. Fool proof in operation.

Write for NEW CATALOG 900 just off the press! All New Equipment. Do it now!

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF THE PETERSEN OVEN CO. • FRANKLIN PARK, ILL.



FORD CLEVELAND FOUNDRY SAVES MONEY with K&R Core Wire Straighteners

Savings ranging from $75.00 to $150.00 a month are not unusual in foundries using K&R Core Wire Straighteners. Proof that these machines are widely recognized as substantial money-savers is seen in the partial list of K&R users at right. Further proof — scores of foundries, like the Ford Cleveland Foundry shown above, own up to 10.

Since a high degree of straightness is not ordinarily required by the average foundry, K&R straighteners are ideal, for they re-straighten core wire to a usable condition — over and over again — as long as it remains ductile. Machines are made in two sizes — DX-5 for wire 1/8" to 3/8" dia., and F-5 for wire 3/16" to 3/4" dia. Bulletin 58B contains all the facts. Send for it.

A few of the companies now using K&R Straighteners . . .

Allis-Chalmers Mfg. Co.
Aluminum Co. of America
American Steel Foundries
Bohn Aluminum & Brass Corp.
Bonney-Floyd Co.
Cadillac Motor Car Co.
Caterpillar Tractor Co.
Central Foundry, Div. of General Motors
Chevrolet-Saginaw Grey Iron Foundry
The Cooper-Bessemer Corp.—Mt. Vernon, Ohio
The Cooper-Bessemer Corp.—Grove City, Pa.
Crane Co.
Delco-Remy Div. General Motors Corp., Anderson, Ill.
Delco-Remy Div. General Motors Corp., Bedford, Ind.
Dodge Steel Co.
Farrel-Birmingham Co., Inc.
Ford Motor Co.—Windsor, Ont.
Ford Motor Co.—Cleveland, O.
Ford Motor Co.—Detroit, Mich.
General Electric Co.—Erie, Pa.
General Electric Co.—Everett, Mass.
General Malleable Corp.
General Steel Castings Corp.
Goulds Pumps Inc.
Hercules Foundry Div. U. S. Challenge Co.
Ingersoll-Rand Co.
International Harvester Co.
International Motor Co.
John Deere Tractor Co.
McKinnon Industries Ltd.
Minneapolis Moline Power Implement Co.
National Malleable & Steel Castings Co.
Oberdorfer Foundries Inc.
Ohio Steel Foundry Co.
Pacific Car & Foundry Co.
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
Pontiac Motor Div. General Motors Corp.
Pratt & Letchworth Co. Inc.
Renault, France
Saginaw Malleable Iron Div. General Motors Corp.
Servel, Inc.
Societe Stein et Roubaiz
St. Louis Steel Casting Co.
Stone & Webster Engineering Co.
Studebaker Corp.
Symington-Gould Corp. (The)
Worthington-Simpson Ltd.
Wright-Aero. Corp.

66 Years of Metalworking Experience Built into K&R Machines:

Cold Roll Forming Machines
Bending Rolls — Straightening Rolls
Crimping Machines
Slitting Lines — Flying Shears & Saws
Hydraulic Tube Benders
Hydraulic Bulldozers — Hydraulic Presses
Edging Machines
Special Metalworking Equipment

KANE & ROACH
INCORPORATED
Syracuse, New York
Established 1887

Industry BRIEFS

UNITED ENGINEERING & FOUNDRY CO., Pittsburgh, has begun work on a multimillion dollar addition to its steel foundry at Vandergrift, Pa. The expansion will boost capacity about 30 per cent.

Gee Co. has been formed to produce shell molding machines, shell core blowers and allied foundry equipment, at 1293 East Cross St., Ypsilanti, Mich. Company utilizes the combined resources of Gladwin Corp., Metco Processing Corp., and the R. F. LaBeau Co. to produce its line of products. Floyd Gladwin, E. Edwin Ensign and Russell F. LaBeau are organizers of the Gee Co.

Westinghouse Electric Corp. has formed a new industrial heating division which will combine the functions of the company's induction heating activities at Baltimore and its industrial heating department at Meadville, Pa. Headquarters of the new division will be at Meadville. Its manager is L. R. Hague, formerly assistant to the manager, transportation and generator division.

DeRoller-Wilshaw Pattern Works Inc., Rochester, N. Y., celebrating its 10th anniversary, has moved to a new location at 390 Clinton Ave. North, Rochester 5. The plant has 7000 sq ft of floor area on two floors, a large parking area for customers and employees and an adjacent building for a small nonferrous foundry planned for in the immediate future.

Ains Foundry & Machine Co., 1 East 42nd St., New York 17, has been granted a charter of incorporation listing capital stock of 200 shares of no par value. Directors are Edward Brucker and Joseph T. DePalo, above address, and Lillian Schwartz, 280 Madison Ave., New York.

American Wheelabrator & Equipment Corp., Mishawaka, Ind., has changed its corporate name to Wheelabrator Corp. The change does not involve any alteration in the ownership, management or operation of the company.

Wayne Shovel & Crane Division, American Steel Dredge Co., Ft. Wayne, Ind., has appointed the following distributors: Contractors Equipment Corp., Portland, Oreg. (Oregon and part of Washington); Larson Equipment Co., Los Angeles (southern California); Pit & Quarry Equipment Co., Indianapolis (central Indiana); and Richland Machinery Co., Sidney, Mont. (eastern Montana and western North Dakota).

Chas. Taylor Sons Co., Cincinnati, a subsidiary of National Lead Co., New York, plans a major expansion and improvement of its Taylor, Ky., plant to increase its capacity about 35 per cent. The firm manufactures special refractories. Work will be started immediately on installation of an additional tunnel kiln, continuous dryers and new grind, screening and batching equipment.

Kingwell Bros. Ltd., San Francisco, manufacturer of bronze bearings and bushings, will move from 457 Minna St., San Francisco, to a new plant in Richmond, Calif., early next year. The Richmond plant will be on a 4½-acre site and will cost $200,000.

Harbison-Walker Refractories Co., Pittsburgh, has purchased a tract of land in Lima, Peru, on which a refractories plant for the production of fire clay, silica and basic refractories will be constructed immediately. Associated with Harbison in the project are Cerro de Pasco Corp., New York and Lima, and Miguel Dammert Muelle, San Isidro, Peru. The new company will be called Refractarios Peruanos, S. A.

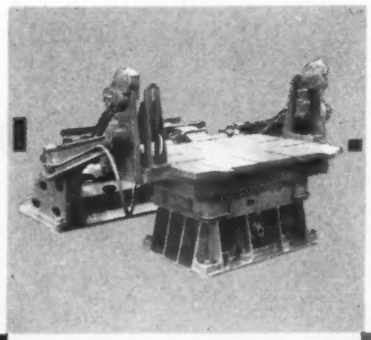
Sandshell Corp. has been incorporated in California and will operate a plant, under construction in Santa Clara, to produce aluminum and copper-base alloy castings by the shell molding process. Operators are G. R. Makepeace, A. R. Ozanich, H. I. Bennett and H. H. Patton, all of whom were formerly associated with the Naval Ordnance Test Station at China Lake, Calif.

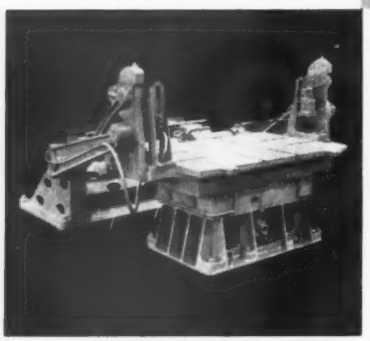
Lester B. Knight & Associates Inc. is now located in its own building at 549 West Randolph St., Chicago 6. This address was incorrectly given as 600 West Jackson Blvd. in July FOUNDRY.

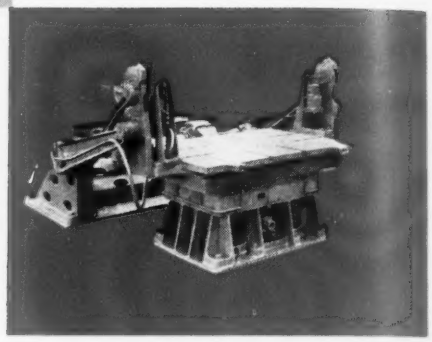
Walworth Co., New York, has purchased the assets and business of M & H Valve & Fittings Co., Anniston, Ala. M & H, with 200,000 sq ft of foundry and machine shop facilities on a 17-acre site, will be

MORE ALUMINUM: The nation's newest primary aluminum operation was opened formally Aug. 15 at Columbia Falls, Mont., plant site of a new $65 million facility owned by Anaconda Aluminum Co. The reduction plant is expected to reach the planned capacity rate of 120 million lb annually by Jan. 1, 1956. High-tension lines, shown at top of the aerial photo, lead to Hungry Horse Dam, located 7 miles to the southeast

it rolls on oil







HERMAN

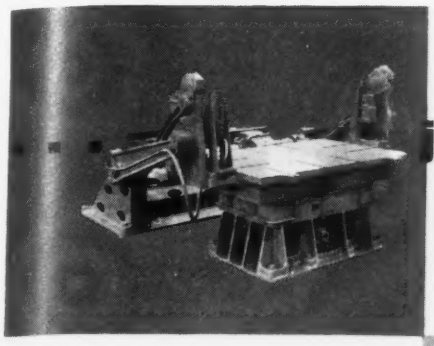
jolt rollover machine

Herman Jolt Rollover Machines are built to glide through any molding sequence with smooth, air-on-oil performance.

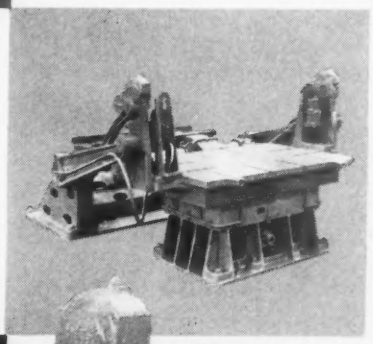
The 3,000 lb. model is no "little brother" in a quality family. It is hydraulically operated, controlled by a single valve and doesn't require power for rollback operations. Like larger Hermans, it eliminates jerkiness with durable cushion action, making it ideal for heavy duty work.

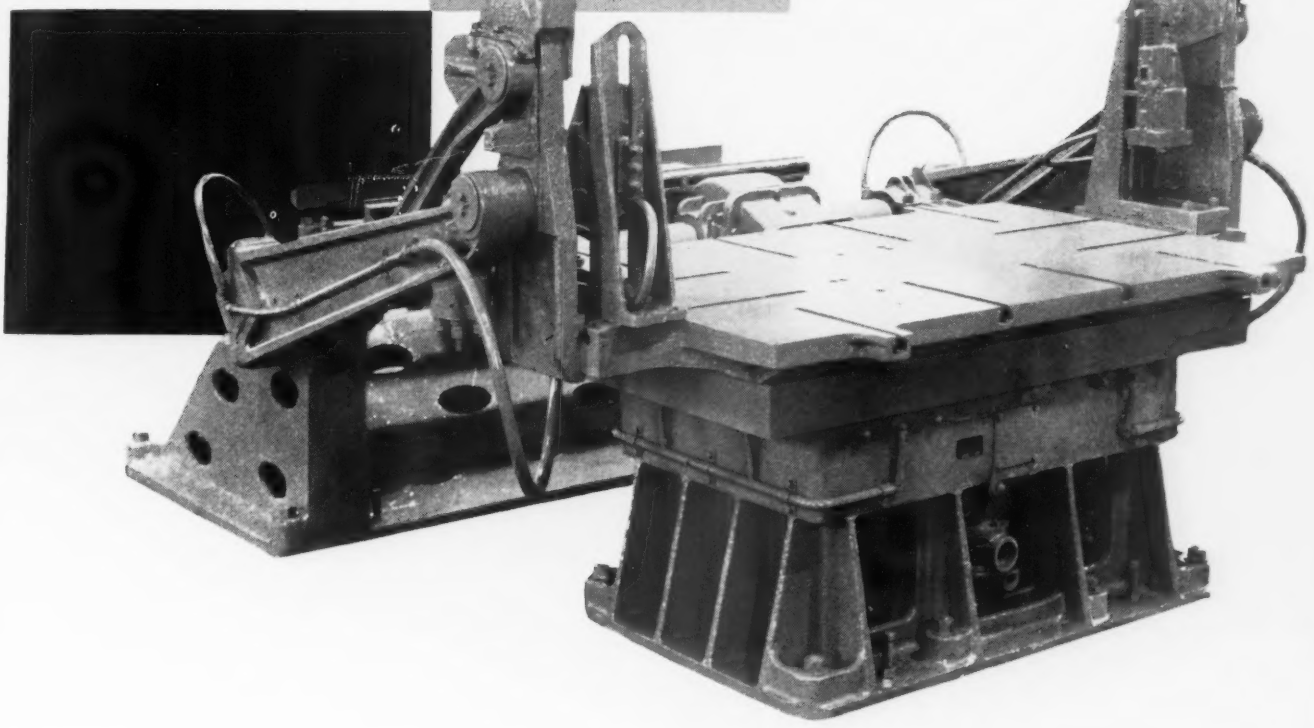
Rollover and pattern drawing mechanisms are in a fluid control system that stand up to the most punishing demands. Herman rollover capacities range up to 40,000 lbs.

There is a Herman Molding Machine for every foundry operation . . . write for more information today.



arrs on air





HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

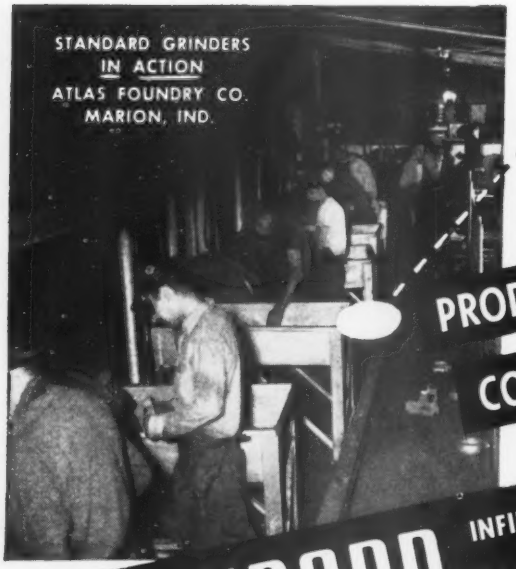
Best Known Name in Molding Machines

operated as a division of Walworth, and all present management and employees will be retained. Walworth, which also operates plants in Boston, Greensburg, Pa., Kewanee and East St. Louis, Ill., and Mineola, N. Y., has closed the malleable section of its Kewanee operation.

Foxboro Co., Foxboro, Mass., has concluded arrangements with Yokagawa Electric Works Ltd., Tokyo, Japan, under which the Japanese firm will manufacture and sell the full Foxboro line.

Frank Harding Foundry Co., New Brighton, Pa., has been purchased by Schaefer Goodnow Foundries Inc., Pittsburgh, and will be operated as the Frank Harding Division of Schaefer Goodnow.

W. W. Sly Mfg. Co., Cleveland, has opened a new branch at 292 Worthington St., Springfield, Mass., for its line of dust control systems, blast cleaning equipment, tumbling mills and industrial ovens. District sales engineer is Joseph Sharkey, formerly with Sly's New York office.



X MARKS THE SPOT . . . where

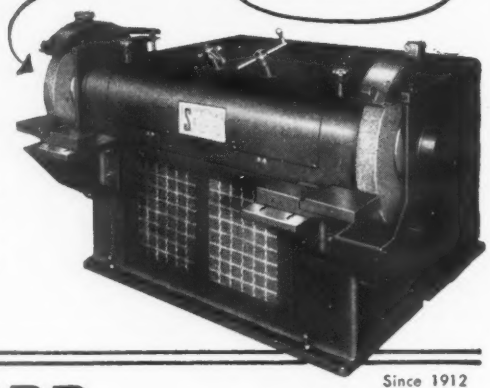
PRODUCTION'S UP 28%

COST IS DOWN 23%

with

STANDARD INFINITELY VARIABLE SPEED SNAGGING GRINDERS

HAND WHEEL Automatically ADJUSTS WHEEL SPEED!



Castings are on the move in Marion! . . . costs cut, production upped, shut-down time nil. And that's the story wherever STANDARD'S Twin-Wheel Snagging Grinders are on the job! Sizes to 100 hp, 20" to 30" wheels. Get the facts today . . . facts that mean a new kind of profit-FUTURE for your foundry. WRITE FOR LITERATURE.

Since 1912

the STANDARD electrical tool co.

SNAGGING GRINDERS AND MACHINE TOOLS

2507 RIVER ROAD • CINCINNATI 4, • OHIO

Industrial Equipment Co., Joplin, Mo., has been appointed by Carboloy Dept. of General Electric Co., Detroit, to distribute its carbide tools, including diamond grinding wheel dressers.

Hewitt - Robins Inc., Stamford, Conn., manufacturer of rubber and machinery products, plans to acquire the business, manufacturing facilities and assets of the W. A. Jones Foundry & Machine Co., Chicago, maker of heavy-duty speed reducers, pulleys, gears and other acccessories used to drive machinery. The Jones plant includes a complete gray iron foundry.

Fulton Sylphon Division, Robertshaw-Fulton Controls Co., has opened a new warehouse at 3101 Imperial Highway, Lynwood, Calif. The warehouse will carry a complete line of temperature controls for industrial applications. It replaces the company's former West Coast distribution unit at 1827 South Hope St., Los Angeles.

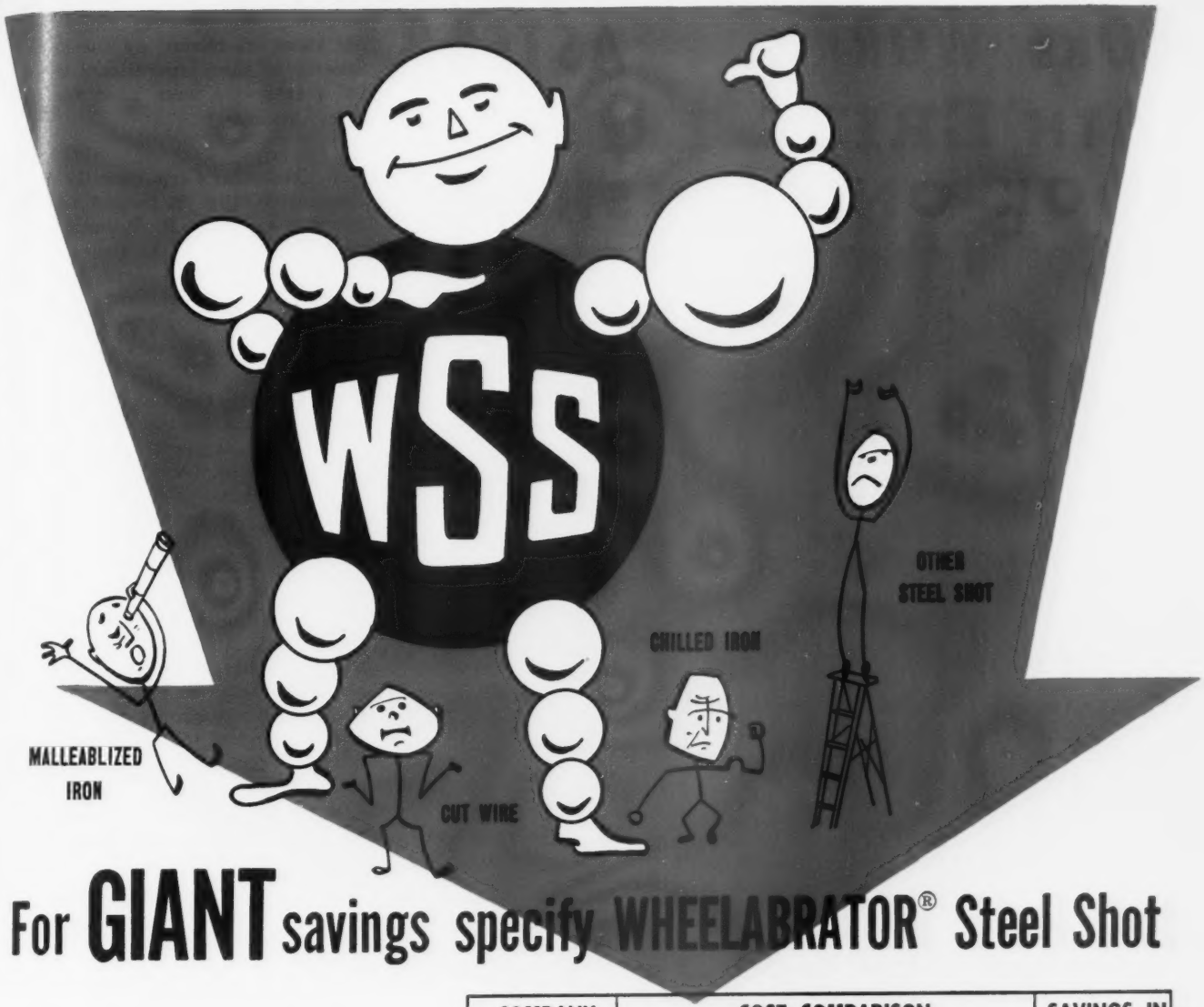
Basic Refractories Inc., Cleveland, has purchased the White Rock, O., Gibsonburg, O., and Buffalo, N. Y., plants of Kelley Island Co., Cleveland, producer of dolomite products for the building industry. The purchase includes related dolomite deposits, business, inventories, company name, patents and trademarks.

Modern Pattern & Plastics Inc., 2113 Canton St., Toledo 2, O., is making extensive improvements to its facilities. The plant, badly damaged by fire in June, is being enlarged and new equipment added. Meanwhile the pattern and plastics divisions have been able to maintain customer requirements and deliveries.

Long Island City Bronze Foundry Inc., 51-25 35th St., Long Island City, N. Y., has been granted a charter of incorporation. Directors listed include Peter Klisz and Helen Klisz, 60-82 70th St., Maspeth, N. Y.; and Aida Dragone, 53-51 69th St., Maspeth.

Worthington Corp., Harrison, N. J., has moved its Midwest regional engineering and service division, formerly located at 400 West Madison St., Chicago, to new quarters at 6124 North Pulaski St., under the direction of L. R. Dise, manager.

Union Carbide & Carbon Corp., New York, has been awarded the National Safety Council's Award of Honor for the second consecutive year. Based on the firm's 1954 safety record, the award was given for a reduction of



For GIANT savings specify WHEELABRATOR® Steel Shot

You may not see the difference by looking at abrasives, but you can't miss the GIANT savings you make when you use Wheelabrator Steel Shot in your blast cleaning machine.

Look at the chart in this ad. These 4 firms have saved 25% to 60% on shot costs by using Wheelabrator Steel Shot. In 2 years over 1,000 firms have changed to Wheelabrator Steel Shot . . . 400 from other steel abrasives. Let Wheelabrator Steel Shot make GIANT savings for you. Start using it today.

COMPANY	COST COMPARISON		SAVINGS IN ABRASIVE COSTS
	MALLEABLIZED IRON	WHEELABRATOR STEEL SHOT	
An Ohio Steel Foundry	$1.35/ton cleaned	$.57/ton cleaned	60%
A Chicago Malleable Foundry	$1.10/ton cleaned	$.60/ton cleaned	45%
	STEEL SHOT AND CUT WIRE	WHEELABRATOR STEEL SHOT	
A Steel Processing Plant	5.06 lb./ton cleaned	2.80 lb./ton cleaned	45%
A Cleveland Gray Iron Foundry	$.465/ton cleaned	$.25/ton cleaned	46%

Write today for Bulletin 89-B

WHEELABRATOR
CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)

505 S. Byrkit St., Mishawaka, Indiana

Trail Blazer of Industrial Progress

MORE WORK . . . FASTER! WITH ERIE STRAYER HOOK-ON CLAMSHELLS

CHECK these exclusive features:

- √ EASY HOOK-ON—no changeover problem. Versatile.
- √ COMPACT, RUGGED DESIGN—longer, tougher service.
- √ LIMITED HEADROOM REQUIREMENT—made for tight spots.
- √ ALWAYS UNDER PERFECT CONTROL—eliminates shock.
- √ ¼ TO 10 YARD CAPACITY—models to suit your needs.

THE FAMOUS **STRAYER ELECTRIC** BUCKET
ALSO AVAILABLE FOR AC OR DC OPERATION

For Catalogs and General Information, Write:

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BUCKETS THE WORLD OVER

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GEIST ROAD • ERIE, PENNSYLVANIA

frequency and severity rates below par rates established by the council. Several of the corporation's individual plants also were cited for their safety records.

Wheelabrator Corp. recently moved its district office in Detroit to 13504 Fenkell Ave. G. R. Bryant is district manager, W. A. Illsley, F. H. Smith and J. W. Swantz, sales engineers, R. D. Haworth Jr. and Leo O'Brien, abrasive engineers and D. W. Miller, district service engineer.

Jeffrey Mfg. Co., Columbus, O., has opened a new district office in Raleigh, N. C., under the management of J. R. Brisley. Located at 116 South Harrington St., the office will promote and sell products of Jeffrey's Conveyor Division in North Carolina and part of Virginia.

Claud S. Gordon Co., 607 West 30th St., Chicago, and 2027 Hamilton Ave., Cleveland, has been appointed exclusive distributor in eight midwestern states of Westinghouse Electric Corp. standard industrial furnaces and related equipment.

National Malleable & Steel Castings Co., Cleveland, has dissolved its wholly owned subsidiary, Capitol Foundry Co., Phoenix, Ariz., and will operate it as its Capitol Foundry Division. Capitol previously had absorbed Arizona Iron Works, its own former subsidiary.

Baldwin-Lima-Hamilton Corp., Philadelphia, has announced the closing of its gray iron foundry at Eddystone, Pa. The shutdown will not affect the company's nonferrous foundry.

Industrial Castings Inc. has been incorporated in Cleveland with 300 shares of common stock at no par value. Agent was Philip F. Rogel, 19800 Miles Ave., Cleveland.

Chicago Tramrail Corp. has occupied its new office and service building at 1330 South Kostner Ave., Chicago. The one-story structure contains 12,000 sq ft of working space.

Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill., has moved into new and expanded facilities at 6610 North Sheridan Rd., Chicago 26.

Oregon-Pacific Mfg. Co., has been incorporated by Scott M. Kelley, Robert L. McFarlane and Jack F. Lesher to operate as a foundry in Portland, Oreg.

Grindle

PART of the Picture

. . . WHEN EFFICIENCY AND ECONOMY ARE A CONSIDERATION

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

● **ACCEPTANCE**— Claiming a rightful place among leading industrial equipment is this GRINDLE Melting-Hot Blast-Dust Collecting System.

● **DUST COLLECTING** — This equipment surpasses all air pollution code requirements, excluding Los Angeles County. More efficient types available, if desired.

● **CONTROL**— Completely automatic control maintained for desired blast temperatures, plus or minus 5 degrees, during 16-hour runs.

GRINDLE *means . . .*

ENGINEERED TO SPECIFICATIONS

. . . this means *increased capacity* of cupolas . . . *less coke* per ton of Iron melted (13/1 ratio). Melting, Heat Treating, Stack Gas Purifying and Accessory Equipment for Ferrous and Non-Ferrous Foundries, with complete assurance that every GRINDLE installation must meet rigid Company standards of Quality, Production, Performance and Economy of Operation.

Why not discuss your problems with a GRINDLE Engineer? Consultation service is available without obligation. Write or phone today!

● **HOT BLAST MELTING** — These GRINDLE #12 cupolas, equipped with GRINDLE recuperative Hot Blast, produce up to 40 tons each, per hour, at a 13/1 coke ratio.

GRINDLE *Corporation*

15401 Park Avenue • Harvey, Illinois
WAterfall 8-7355

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

ONE disadvantage of the CO_2-silicate mold and core-bonding process is that the sand is discarded after use. This is because of the presence of low-melting-point alkalies which, if allowed to accumulate in the sand system, ultimately would have a deleterious effect on the refractoriness of the sand. However, an investigation of the possibility of reclamation of such sand by the British Steel Castings Research Association (Sheffield, England) indicates that use of a log washer unit removes some 78 per cent of the water-soluble alkali present in the sand. Effect of the residual alkali on the sand remains to be determined.

Serves in Atomic Field

INDISPENSABLE role of cast stainless components in production of commercial power from atomic energy was emphasized recently at a high-alloy castings conference held at Wrightsville Beach, N. C. Reporting on a study of materials for a special double volute pump, a representative of the Atomic Equipment Department, Westinghouse Electric Corp., pointed out that while many types of construction were considered, final design utilized a casting made of low-carbon, columbium-stabilized modification of the standard CH-20 type alloy. Under Alloy Casting Institute designation system this alloy, containing 0.08 max C, 12 to 15 Ni, 22 to 26 Cr and Cb 10 x C, would be labeled type CH-8C.

Index for Sand

JAPANESE investigator Jiro Kashima in *Report of the Castings Research Laboratory*, No. 6,1955 published by Waseda University, Tokyo, Japan, describes a new procedure for determining the grain size index of sands. The clay-free sand is wetted with ethylene glycol or preferably glycerine and then centrifuged at 3000 rpm to remove all but the thin layer adhering to the sand grains. A weighed amount of the coated sand is taken and the amount of glycerine adhering is ascertained by use of potassium dichromate and colorimetric or titration methods. Glass beads similarly treated were used as the base, and grain size index is given as the value of the glycerine on the sand divided by the glycerine on the glass beads. The author used glass beads such as used on motion picture screens, but in this country one could secure beads developed by the National Bureau of Standards for sieve testing. The author states that the grain size index measurement can be accomplished in 30 to 40 minutes and the error is less than 5 per cent.

Saves Analyst's Time

RECENT article in July-August issue of *General Motors Engineering Journal* entitled "A Method for the Simultaneous Quantitative Analysis of Carbon and Sulphur in Steel and Cast Iron" by Franklin L. Racine, GMC Truck and Coach Division, describes a development using an electronic feedback circuit to control automatically the titration of the sulphur with iodate solution beginning at the time the latter enters the sulphur chamber. Result is that total time for carbon and sulphur analyses is 4 minutes, including 30 seconds to weigh the carbon dioxide absorption tube. Only one sample is required. It is claimed that the method is time-saving and provides improved accuracy, dependability and flexibility.

Studies Creep in Nickel

AS PART of a long research program the National Bureau of Standards recently completed a study of the creep characteristics of high purity nickel. Investigation by W. D. Jenkins, T. G. Digges and C. R. Johnson dealt with creep behavior in tension under constant load at 300, 700, 900 and 1200° F. In general, creep occurred in three stages which follow initial extension on application of the load. First is one of decreasing rate of extension. In the second, creep proceeds at nearly a constant rate. Third stage is one of increasing rate culminating in complete fracture. Discontinuous flow was observed in each of the three stages. Experimental values for primary creep agreed fairly closely with results predicted by the theory of exhaustion and generation of dislocations, as proposed by Mott and Narbarro and modified by others. However, creep rate in the secondary and tertiary stages could not be predicted accurately by existing formulas.

High Temperature Uses

RESEARCH sponsored by the Alloy Casting Institute and conducted at Battelle Memorial Institute resulted in new information for designers of power plants and high-temperature processing equipment. Described in a paper, "An Investigation of the 21 Per Cent Chromium-10 Per Cent Nickel Heat Resistant Casting Alloy," by A. M. Hall, R. J. Mangone and D. D. Burgan which was presented at the recent annual ASTM meeting, the authors point out that the alloy can be substituted effectively for alloys containing substantially greater amounts of nickel and chromium in the temperature range of 1200 to 1600° F. At 1400° F the load-carrying ability of the alloy is 14,000 to 15,000 psi for 100-hour rupture life, or about equivalent to the higher alloyed types.

Grain Size Effect

IN A paper, "Influence of Grain Size on the Structure, Pressure-tightness and Tensile Properties of Sand-cast Bronzes and Gunmetals," presented at the recent annual meeting of the Institute of British Foundrymen, the author, A. Cibula, indicates that in both well-fed and poorly-fed castings the total porosity was least in alloys of finest grain size. In castings with columnar structures shrinkage porosity tended to concentrate at the centerline, leaving the skin of the casting sound. In the fine-grained castings, porosity was dispersed, leaving little or no sound skin, and occurred largely in layers perpendicular to the direction of feeding. Because of their unfavorable distribution of porosity, grain-refined castings had much poorer pressure-tightness and, generally, mechanical properties.

BASIC NEWS FOR CUPOLA OPERATORS

Basic Refractories offers field service to foundries

Cupola operators interested in adopting a basic practice can get refractory maintenance information and assistance from Basic Refractories' engineers. These men know refractory application and are familiar with cupola practice.

BASIC CUPOLA OPERATION OFFERS IMPROVED METALLURGY

The improved metallurgy possible with basic slag systems enables cupola operators to produce base irons of low sulphur content. Because of the refining nature of these slags, and the carbon pickup accompanying basic operation, it is possible to obtain good results even while using a lower cost charge. Low sulphur content is an important factor when alloying base irons. Less alloy is required to obtain desired results. This saving, together with the saving on charged materials, makes basic operation preferable in the manufacture of relatively new cast irons.

Basic linings for cupolas offer 8 advantages

Costs of basic linings are higher than acid. But these costs are offset by the following advantages:

1. **Lower sulphur content in the iron produced**
2. **Greater carbon pickup**
3. **Higher metal tap temperatures**
4. **Use of lower cost charges**
5. **Absence of bridging and clean drop**
6. **Better pouring characteristics of metal**
7. **Less scrap castings**
8. **Steel scrap can be substituted for low phosphorous pig iron without lowering the total carbon content of the iron.**

Newly developed irons widely accepted because of unique properties

Many machine parts that before could only be manufactured by forging or casting steel, can now be made with these newly developed cast irons. Properties such as abrasion, heat resistance, fatigue, impact strength, and ductility have made the new irons widely accepted by design engineers.

Other important properties are high yield strength, good machinability, hardenability and weldability. Irons possessing these properties have opened up many new fields to the foundryman.

Gundol recommended for basic cupola maintenance

Gundol, a granular basic gun refractory, is highly adaptable and widely used to maintain basic cupola furnaces in this country. Designed for gun emplacement it affords the basic cupola operator a quick, easy method of furnace repair. Gun emplacement of the refractory forms a dense, monolithic lining eliminating joints and keeping maintenance costs at a minimum.

Write now for a comprehensive booklet on gunning and gun refractories.

BRI Gun, model A-20, with 20 cubic foot hopper. Nozzle and 50 feet of shooting hose included with gun. Operation also requires hoses to connect with plant water and air lines.

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Proposed Revised

Tentative Specifications for Foundry Pig Iron

ASTM Designation A 43—T

Issued 1945; Revised 1949, 1955

(Concluded from August)

(b) In addition to carbon there are other unspecified elements found in pig iron, commonly referred to as incidental elements. These elements may total as much as several per cent, depending upon their content in the raw material, and can materially influence the properties of castings. Some of these incidental elements are specifically introduced into the pig iron in sufficient quantity to have beneficial effects on the castings. Other incidental elements may be neutral or harmful in their effect on the properties of certain types of castings, depending on the nature and quantity of these elements. A partial list of incidental elements which may be found in pig iron are:

aluminum	boron	copper	selenium	titanium
antimony	chromium	molybdenum	tin	vanadium
arsenic	lead	nickel	tellurium	

Where the effect of incidental elements is important, special agreement as to these elements shall be made at the time of purchase.

Sampling

6. (a) The manufacturer shall establish sampling, handling, stock-piling, and shipping methods which will assure the delivery of pig iron conforming to these specifications.

(b) The sampling of a carload lot of pig iron shall be made at the point of delivery in accordance with the procedure described in Section 3 of the Methods of Sampling Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron (ASTM Designation: E 59). The sampling of shipments in other than carload lots shall be agreed upon at the time of purchase.

Chemical Analysis

7. Analysis shall be made in accordance with the procedures for cast iron as described in the Methods of Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron (ASTM Designation: E 30).

Referee Analysis

8. In case of dispute, the sampling and chemical analysis shall be made in accordance with the procedures described in ASTM Methods E 30, by a chemist, mutually agreed upon, whose decision shall be final. The cost of such reanalysis shall be borne by the party in error.

Rejection

9. All pig iron which fails to conform to these specifications shall be subject to rejection.

Table I (concluded)

Grade	Si, per cent	S, max per cent	P, per cent	Mn, per cent
	Foundry High Phosphorus Pig Iron			
Fh 1	1.75 max.	0.05	0.71 to 0.90	0.25 to 0.50
Fh 2	1.76 to 2.00	0.05	0.71 to 0.90	0.25 to 0.50
Fh 3	2.01 to 2.25	0.05	0.71 to 0.90	0.25 to 0.50
Fh 4	2.26 to 2.50	0.05	0.71 to 0.90	0.25 to 0.50
Fh 5	2.51 to 2.75	0.05	0.71 to 0.90	0.25 to 0.50
Fh 6	2.76 to 3.00	0.05	0.71 to 0.90	0.25 to 0.50
Fh 7	3.01 to 3.25	0.05	0.71 to 0.90	0.25 to 0.50
Fh 8	3.26 to 3.50	0.05	0.71 to 0.90	0.25 to 0.50
Fh 9	1.75 max.	0.05	0.71 to 0.90	0.51 to 0.75
Fh 10	1.76 to 2.00	0.05	0.71 to 0.90	0.51 to 0.75
Fh 11	2.01 to 2.25	0.05	0.71 to 0.90	0.51 to 0.75
Fh 12	2.26 to 2.50	0.05	0.71 to 0.90	0.51 to 0.75
Fh 13	2.51 to 2.75	0.05	0.71 to 0.90	0.51 to 0.75
Fh 14	2.76 to 3.00	0.05	0.71 to 0.90	0.51 to 0.75
Fh 15	3.01 to 3.25	0.05	0.71 to 0.90	0.51 to 0.75
Fh 16	3.26 to 3.50	0.05	0.71 to 0.90	0.51 to 0.75
Fh 17	1.75 max.	0.05	0.71 to 0.90	0.76 to 1.00
Fh 18	1.76 to 2.00	0.05	0.71 to 0.90	0.76 to 1.00
Fh 19	2.01 to 2.25	0.05	0.71 to 0.90	0.76 to 1.00
Fh 20	2.26 to 2.50	0.05	0.71 to 0.90	0.76 to 1.00
Fh 21	2.51 to 2.75	0.05	0.71 to 0.90	0.76 to 1.00
Fh 22	2.76 to 3.00	0.05	0.71 to 0.90	0.76 to 1.00
Fh 23	3.01 to 3.25	0.05	0.71 to 0.90	0.76 to 1.00
Fh 24	3.26 to 3.50	0.05	0.71 to 0.90	0.76 to 1.00
	Foundry Intermediate Phosphorus Pig Iron			
Fm 1	1.75 max.	0.05	0.51 to 0.70	0.50 to 0.75
Fm 2	1.76 to 2.00	0.05	0.51 to 0.70	0.50 to 0.75
Fm 3	2.01 to 2.25	0.05	0.51 to 0.70	0.50 to 0.75
Fm 4	2.26 to 2.50	0.05	0.51 to 0.70	0.50 to 0.75
Fm 5	2.51 to 2.75	0.05	0.51 to 0.70	0.50 to 0.75
Fm 6	2.76 to 3.00	0.05	0.51 to 0.70	0.50 to 0.75
Fm 7	3.01 to 3.25	0.05	0.51 to 0.70	0.50 to 0.75
Fm 8	3.26 to 3.50	0.05	0.51 to 0.70	0.50 to 0.75
Fm 9	1.75 max.	0.05	0.51 to 0.70	0.76 to 1.00
Fm 10	1.76 to 2.00	0.05	0.51 to 0.70	0.76 to 1.00
Fm 11	2.01 to 2.25	0.05	0.51 to 0.70	0.76 to 1.00
Fm 12	2.26 to 2.50	0.05	0.51 to 0.70	0.76 to 1.00
Fm 13	2.51 to 2.75	0.05	0.51 to 0.70	0.76 to 1.00
Fm 14	2.76 to 3.00	0.05	0.51 to 0.70	0.76 to 1.00
Fm 15	3.01 to 3.25	0.05	0.51 to 0.70	0.76 to 1.00
Fm 16	3.26 to 3.50	0.05	0.51 to 0.70	0.76 to 1.00
Fm 17	1.75 max.	0.05	0.51 to 0.70	1.01 to 1.25
Fm 18	1.76 to 2.00	0.05	0.51 to 0.70	1.01 to 1.25
Fm 19	2.01 to 2.25	0.05	0.51 to 0.70	1.01 to 1.25
Fm 20	2.26 to 2.50	0.05	0.51 to 0.70	1.01 to 1.25
Fm 21	2.51 to 2.75	0.05	0.51 to 0.70	1.01 to 1.25
Fm 22	2.76 to 3.00	0.05	0.51 to 0.70	1.01 to 1.25
Fm 23	3.01 to 3.25	0.05	0.51 to 0.70	1.01 to 1.25
Fm 24	3.26 to 3.50	0.05	0.51 to 0.70	1.01 to 1.25

Miscellaneous Information for the Patternmaker's Notebook

Frequently pipe connections are made to castings and the patternmaker has to figure on cores of proper size to admit the pipe. The finished diameters of the cored holes for various sizes of pipe are given, with other information, in the pipe table below. The table of wood screw data shows the size drills to use in drilling patterns for screws of various sizes. The sizes of drills less than ¼-inch diameter are given in Brown & Sharpe wire gage numbers. The fillet table gives the principal dimensions of leather fillets.

Wrought Iron Pipe Data

Size, inches	⅛	¼	⅜	½	¾	1	1¼	1½	2
Actual external diam.	0.405	0.54	0.675	0.84	1.05	1.32	1.66	1.90	2.38
Actual internal diam.	0.27	0.364	0.494	0.623	0.824	1.05	1.38	1.61	2.07
No. of threads	27	18	18	14	14	11½	11½	11½	8
Size of tap drill. (Cored holes must be finished to this diameter)	21–64	29–64	19/32	23/32	15/16	1 5/16	1 11/32	1 15/32	2 3/16
Size, inches	2½	3	3½	4	4½	5	6	7	8
Actual external diam.	2.88	3.5	4	4.5	5	5.56	6.63	7.63	8.63
Actual internal diam.	2.47	3.07	3.54	4.03	4.51	5.04	6.07	7.023	7.982
No. of threads	8	8	8	8	8	8	8	8	8
Size of tap drill. (Cored holes must be finished to this diameter)	2 5/8	3 1/4	3 3/4	4 1/4	4 3/4	5 5/16	6 3/16	7 3/8	8 3/8

Wood Screw Data

No. of screw	20	18	16	14	12	10	9	8	7	6	5	4	3	2
Drill for body	5/16	9/32	17/64	15/64	2	10	17	19	26	28	30	36	39	44
Drill for threads	15/64	1	6	12	19	23	26	29	33	37	41	44	47	50

Data on Leather Fillets

No.	1	2	3	4	5	6	8	10	12	14	16
Size or radius	1/16	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
Width of face	3/32	3/16	5/16	3/8	1/2	9/16	3/4	31/32	1 5/32	1 3/8	1 9/16

To Find the Length of a Chord to Divide the Circumference of a Circle Into N Equal Parts, Multiply S by the Diameter

N	S	N	S	N	S	N	S
1		26	.12054	51	.061560	76	.041325
2		27	.11609	52	.060379	77	.040788
3	.86603	28	.11197	53	.059240	78	.040267
4	.70711	29	.10812	54	.058145	79	.039757
5	.58779	30	.10453	55	.057090	80	.039260
6	.50000	31	.10117	56	.056071	81	.038775
7	.43388	32	.098018	57	.055089	82	.038303
8	.38268	33	.095056	58	.054139	83	.037841
9	.34202	34	.092269	59	.053222	84	.037391
10	.30902	35	.089640	60	.052336	85	.036953
11	.28173	36	.087156	61	.051478	86	.036522
12	.25882	37	.084804	62	.050649	87	.036103
13	.23932	38	.082580	63	.049845	88	.035692
14	.22252	39	.080466	64	.049068	89	.035291
15	.20791	40	.078460	65	.048312	90	.034899
16	.19509	41	.076549	66	.047582	91	.034516
17	.18375	42	.074731	67	.046872	92	.034141
18	.17365	43	.072995	68	.046184	93	.033774
19	.16460	44	.071339	69	.045515	94	.033415
20	.15643	45	.069756	70	.044865	95	.033064
21	.14904	46	.068243	71	.044232	96	.032719
22	.14232	47	.066793	72	.043619	97	.032381
23	.13617	48	.065401	73	.043022	98	.032051
24	.13053	49	.064073	74	.042441	99	.031728
25	.12533	50	.062791	75	.041875	100	.031411

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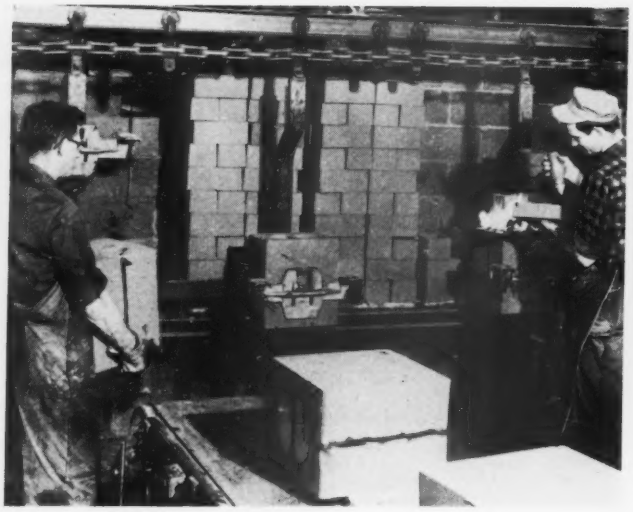

Fig. 1—Molds are delivered on the belt conveyor, pouring basins on roller conveyor in background

Fig. 2—Molds are poured while the conveyor is in motion, and they go to the penthouse for cooling

Saving Floor Space and Manpower with an

OVERHEAD CONVEYOR

By WILLIAM D. DUNN
Assistant to the President
Oberdorfer Foundries Inc.
Syracuse, N. Y.

OBERDORFER Foundries Inc., one of the country's largest aluminum foundries, has quadrupled production without increasing floor space and saved manpower by handling molds and castings on an overhead trolley conveyor.

The company was faced with the problem of expanding the capacity of its cylinder head aluminum foundry from 25,000 pounds to 100,000 pounds per day. The higher schedule required several times more floor space than was available. Expansion, however, had several drawbacks. New construction is expensive and slow, and production would be interrupted when it was time to move into the new facilities. At that time an increase in production was essential. The flexibility of the new facilities was considered; a building can't be stretched or shrunk to fit production increases or decreases.

Unit production costs would have increased with more floor space because the molds would be spread over a greater area; this would mean the metal would have to be carried farther—less production for an equal amount of effort.

It was soon realized that plant expansion was a poor solution to the problem of the increased schedule. We were aware that the ceiling was the same size as the floor and wasn't too productive, so it seemed this might be the answer to the increased floor space requirement. We called in the Lamson Corp. engineer to discuss overhead trolley conveyors. Working together, the problem soon was solved with two conveyor systems. These include a 4-in. overhead trolley conveyor for handling molds and a 3-in. system for handling castings.

The 4-in. mold-handling conveyor begins at the core ovens. The dry sand molds are built up in an assembly line method on a belt conveyor and are transferred to a bench-height shelf type rack which is hung from the overhead trolley conveyor. Pouring basin cores are attached to the molds as they move along an out-of-the-way wall to the pouring floor. The conveyor extends out only 24 in. from the wall. At the pouring floor, the conveyor descends so that the molds pass the pourers at a convenient height for pouring. Molds are poured (Fig. 2) as the conveyor moves at a speed of about 7 ft per minute. It has a speed adjustment of from 5 to 15 ft which affords a

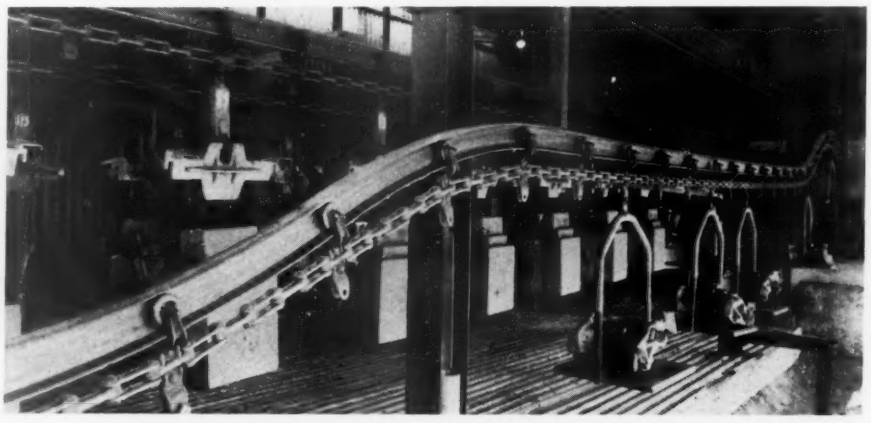

Fig. 3—This zigzag conveyor located on the roof provides cooling time for molds and eliminates the heat, gas and smoke from the cooling floor

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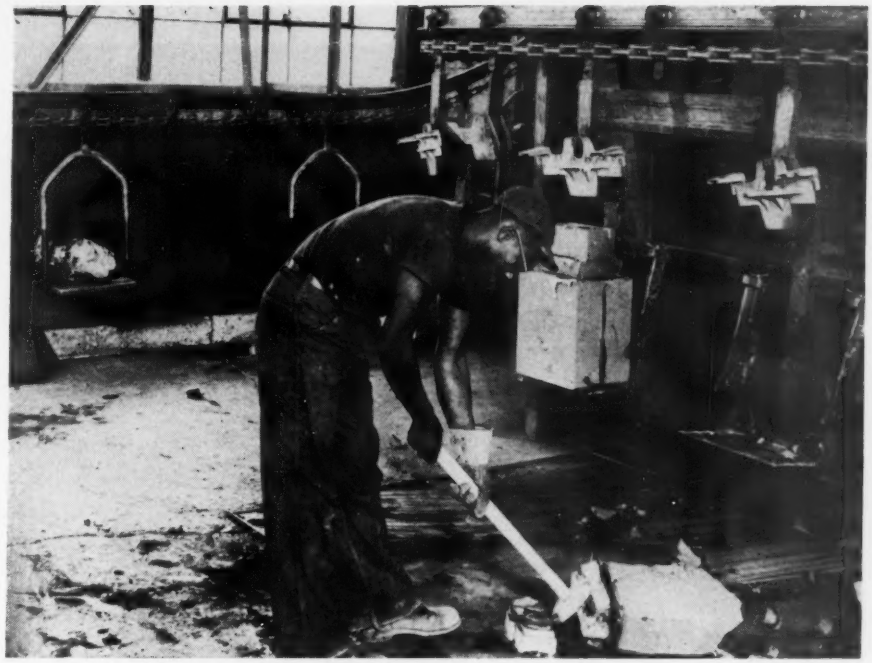


Fig. 4—Molds are broken up, and gates, sprues and risers are knocked off, after which the castings are transferred to the 3-in. conveyor

wide range of flexibility to accommodate changes in schedules as well as castings of different sizes.

Melting Department—There are four reverberatory furnaces and eight holding pots, the latter being in a line in front of the furnaces. The conveyor parallels the line of holding pots. A control button on the pouring floor allows the pourers to adjust the conveyor speed as required. As the molds pass from the pouring floor, they ascend to the penthouse where a zigzag system (Fig. 3) provides cooling time. Removing the molds to the roof of the building immediately after pouring has completely eliminated the problem of gas, fumes and heat. Working conditions on the pouring floor are as favorable as in any other department in the plant.

The conveyor then carries the cooled molds to a knock-out room at one end of the penthouse. The dry sand molds are knocked off and dropped into a chute which carries them to a crusher on the first floor. The risers can be easily removed and dropped into a chute where they are collected in a tote box on the first floor.

This particular section of the conveyor demonstrates some of the advantages of overhead trolley conveyors. The flexibility of elevation is demonstrated in that it is possible to build up the bench height (30 in.) and pour the molds at a height of 15 in. The poured molds are elevated from the molding floor to the penthouse at a steep angle (about 60 degrees) which means that almost no floor space is lost. Heat and fumes from the molds follow the inclined path of the conveyor, and ascension of the molds and racks accelerates dissipation of the heat and fumes.

Utilization of the roof not only is a space saver, but the molds and salvage metal that result from the knock-out operation can be returned to process by gravity.

Casting Conveyor—The 3-in. casting conveyor begins at the penthouse. A lighter system was installed in the interest of economy since only the castings are carried. Shelf type racks similar to the ones on the 4-in. conveyor are used to carry the castings from the knock-out room to the first operation on the ground floor where the chills are removed. The castings are replaced on the conveyor and cross the room to the saws where the gates are removed. This second station is located across the room to provide a second cooling period. To insure adequate cooling, a water tank about 15 ft in length is located under the conveyor system so that the castings can be immersed for approximately two minutes while en route.

The castings are carried through the succeeding operations on the conveyor. They are always delivered and picked up at the exact elevation most convenient to the operator.

There has been a real savings in the reduction of scrap loss. The castings were formerly trucked and located as near to the operator as possible; at best only a few in each rack were in a convenient location so the operator had to reach for most of them. Frequently, one would be dropped on the floor, and the fins would bend. It was the usual thing for the fins to break off during the straightening operation and the casting would be lost. The conveyor system has almost eliminated this loss.

This system made it possible for the foundry to reach its production level of 1600 aircraft and tank engine cylinder heads per 16-hour day in a matter of a few weeks. At one point, a production of 1900 per day was sustained for 20 working days. This production was maintained with only eight men pouring.

The entire installation was completed within approximately ten weeks with no noticeable interruption to production, and paid for itself in less than one year. Inasmuch as the system is made up of standard types of units, it can be extended, shortened, or changed to meet any schedule or type of casting.

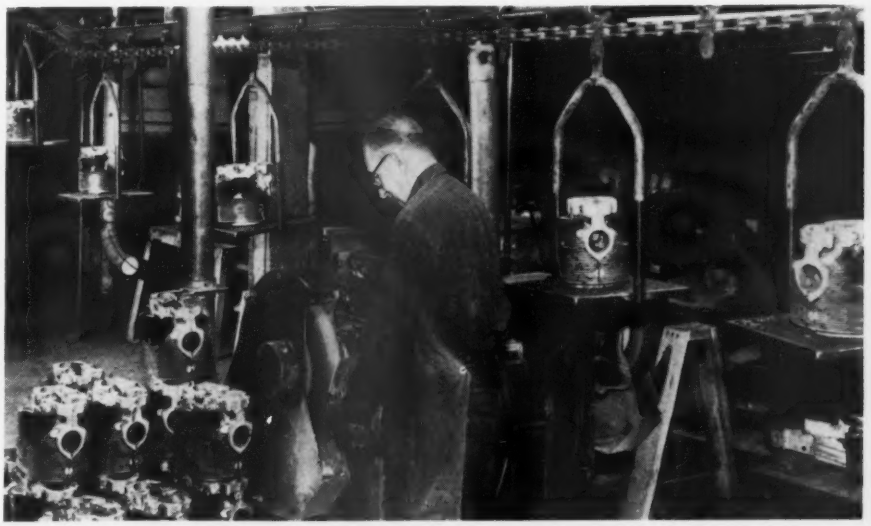
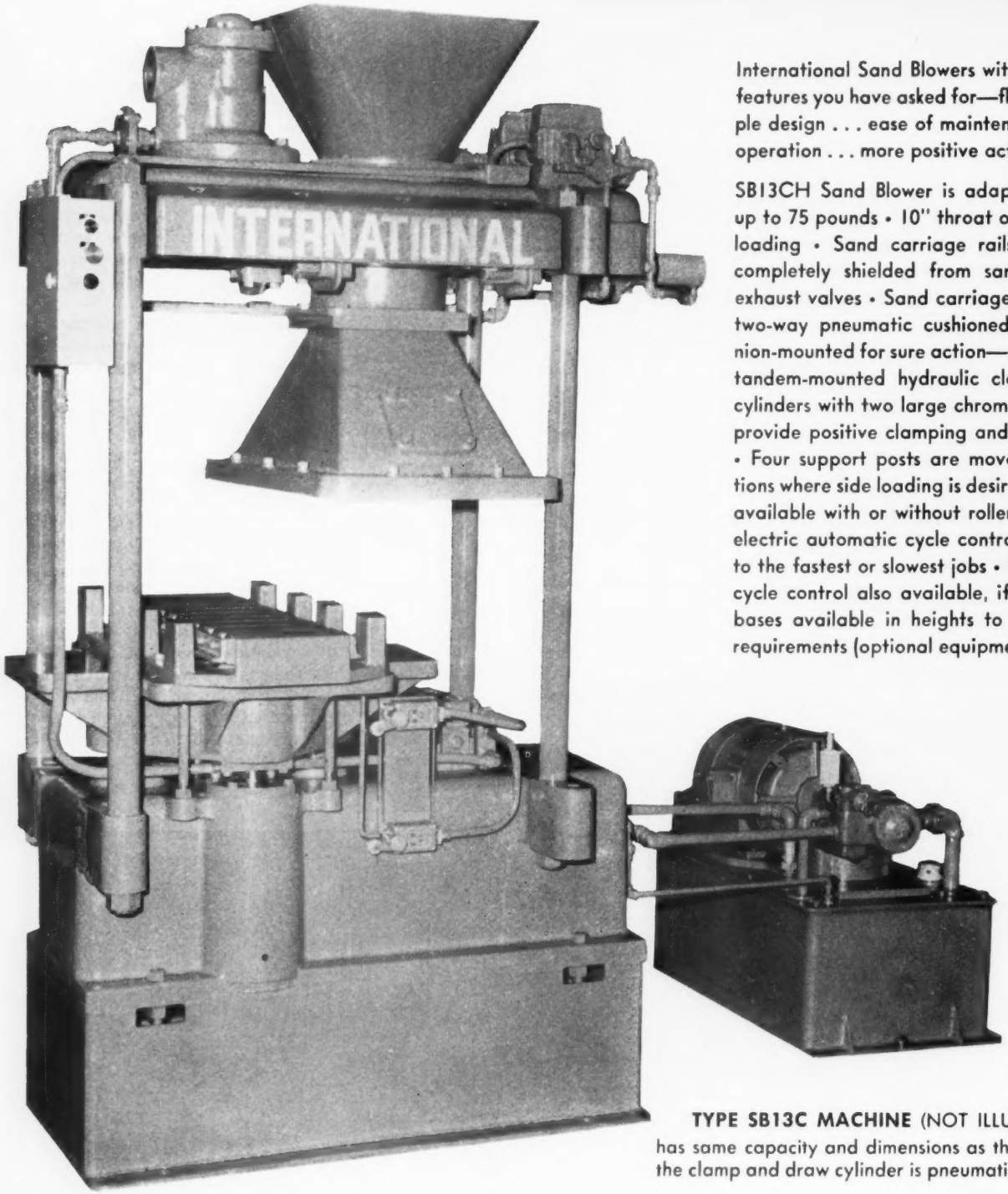


Fig. 5—Castings are delivered to each operation at the proper height

PROVEN — EFFICIENT — FA

INTERNATIONAL'S SB13CH



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TYPE SB13C MACHINE (NOT ILLUSTRATED) has same capacity and dimensions as the SB13CH, but the clamp and draw cylinder is pneumatically operated.

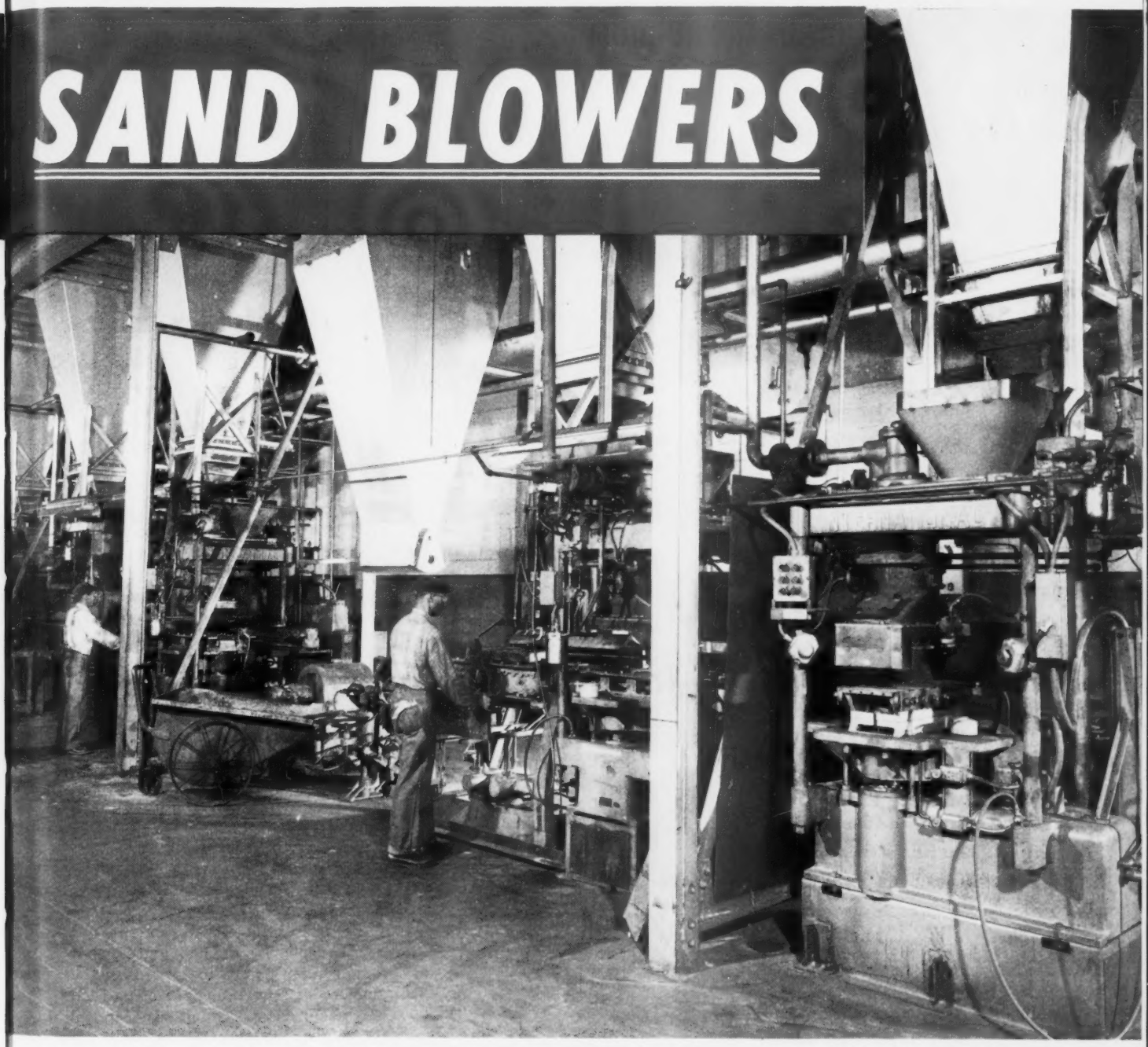
INTERNATIONAL

A few

M

FAST — POSITIVE ACTION

SAND BLOWERS



A few machines in one section of a large installation of International **SB13CH** Sand Blowers recently installed in a New Automotive Foundry.

INTERNATIONAL builds 90 different types of machines in more than 1400 different sizes, for every foundry need. Yet, if your particular problem requires special features, we will modify or build to your exact specifications . . .

That's why we say: **"There's an INTERNATIONAL for EVERY Type of Job"**

The INTERNATIONAL LINE is designed by experienced foundry engineers who have a practical working knowledge of the problems of the industry.

MOLDING MACHINE CO.

LA GRANGE PARK, ILLINIOS

For protection in the foundry...

JAXCOLITE!*

We don't imagine there has ever been a safety material devised that is so right for foundry use as Jaxcolite-coated asbestos, duck or burlap.

Jaxcolite is a new compound. It has been thoroughly tested, proved and approved. Applied to the materials mentioned above, *it provides exceptional* resistance to molten metal splash, to heat, to burn, to the strongest acids and caustics, and of course to oil and water. Yet it wears well, it is flexible, lightweight and comfortable. Its cost is low. And the amazing thing is that people who use it simply refuse to buy anything else.

Steel-Grip makes a complete line of safety apparel made from Jaxcolite materials. The list is shown on this page. We earnestly urge you to send for trial swatches of this material and make any tests you want. It may prove to be *THE* answer to safety problems long unsolved. Send today.

**A product of Jaxind, Inc.*

INDUSTRIAL GLOVES COMPANY

A Corporation

1681 Garfield Street, Danville, Illinois

(In Canada: Safety Supply Co., Toronto)

1. **Amazing Jaxcolite Coated Materials are made up into Steel-Grip guaranteed quality safety apparel, VIZ:**

Coats	Sleeves
Pants	Leggings
Aprons	Spats

Gloves and Mitts with Jaxcolite backs

Curtains

Send for trial garment and prove its superiority for yourself.

2. ***We manufacture a complete line of safety apparel for every need, in leather, duck, Perma-Proof materials, asbestos, wool, Dynel cloth, Jaxcolite coated materials, aluminum coated materials, etc. These garments reflect in their materials, design and manufacture the high quality standards that have made Steel-Grip the outstanding supplier in the United States. Write for a catalog.***

TO BE SURE OF THE GENUINE, DEMAND THIS TRADE-MARK

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Backlog of Know-how"

SOME TIME AGO I read a FOUNDRY article entitled "Aluminum Sand Foundry Practice." The author, W. D. Stewart, referred in his introduction to "a great backlog of engineering know-how." Although the entire article was excellent, it was the phrase "backlog of know-how" that kept recurring to me.

After all, isn't the entire educational process mostly a matter of building up a backlog, something to be sold, used, or consumed later, at a "more convenient time" as the radio man puts it?

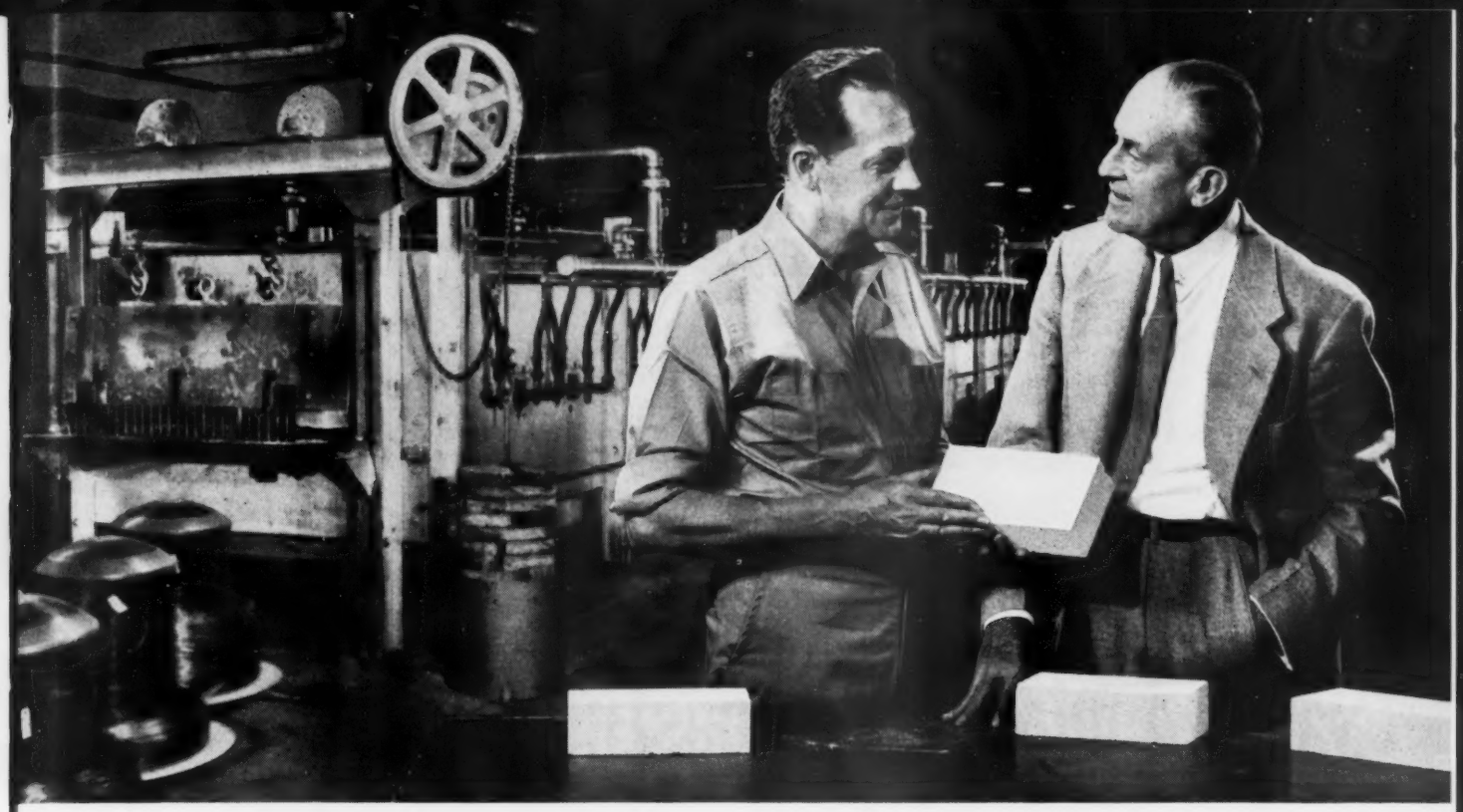
According to Webster, a backlog is "the large log of wood at the back of a hearth fire" or, colloquially, "a reserve of unfilled orders" or, loosely, "any sustaining force or reserve."

The second definition, "a reserve of unfilled orders," seems to be most popular with foundrymen. Although I must admit it is a cheerful word arrangement, I am still intrigued by Webster's concluding definition "any sustaining reserve."

It may well be that a great difference between a good and a poor foundryman can be measured by the amount of sustaining reserve each has acquired. It might be likened to money in the bank—working capital. At any rate, it is something we depend upon every day of our lives, in whatever circles we move and in almost everything we do. It lies in the realm of memory and discrimination.

Filing cabinets, properly arranged, may be excellent depositories for temporary or even enduring records of both business transactions and methods of procedure, but a well trained memory is still the foundryman's most reliable guide in making the innumerable decisions of his daily program. He cannot run to a filing cabinet every time an instruction is to be given.

A workable "know-how" may consist of both artistic and scientific ability, with one supplementing the



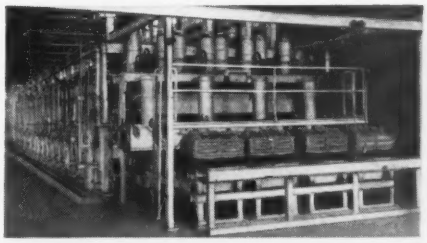
How to Select the Most Economical Insulating Firebrick

The advantages of lightweight insulating firebrick over ordinary "heavyweight" firebrick are generally known to furnace operators and furnace builders. But many buyers have wondered just what advantages there might be in one brand of insulating firebrick as against another. The answer to this question could very well mean savings in fuel costs, increased furnace output, longer life . . . or all three.

One furnace builder ran tests on their small electric kilns where heat input could be measured with great accuracy. Here's what they found: B&W IFB required 25% less heat than any other brand of insulating firebrick they tried.

The reason? B&W IFB are lighter in weight than any other insulating firebrick — they contain more tiny, insulating air cells. Heavier, denser insulating firebrick linings waste fuel two ways: They soak up and store more heat which is lost when the furnace is cooled; and they conduct more heat through the walls.

How about long life? One of the

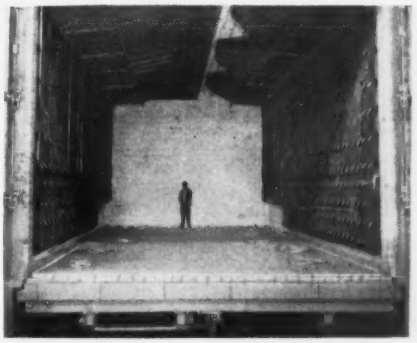


toughest tests of firebrick is in the lining of a carbon monoxide furnace. Some brands last only a few weeks, then disintegrate, due to iron oxide impurities in the brick which react with the gas.

But B&W Insulating Firebrick contain little iron oxide, and they're processed at high temperatures so that any traces of iron oxide form stable compounds. So instead of deteriorating they stay on the job year after year —in many cases over 10 years.

Another factor, important to many furnace operators, is accurate temperature control. Here again B&W IFB have an advantage over other insulating firebrick. First, because B&W IFB are lighter in weight they store and conduct less heat—and they respond more quickly to changes in heat input.

A typical example is the giant stress-relieving furnace shown below—sixty feet by twenty-two feet by seventeen feet high. The B&W lining plays a vital part in holding the desired temperature within 5 degrees accuracy!



Next time you buy or specify insulating firebrick, remember that the lightest weight brick of all—B&W—has the highest insulation value, the longest life and the greatest furnace heat controllability.

THE BABCOCK & WILCOX CO.
Refractories Division
General Offices:
161 East 42nd St., New York 17, N. Y.
Works: Augusta, Ga.

(Advertisement)

R-819

other. The human memory is a marvelous instrument, and it certainly tends to improve with use. Whether we ever really forget anything is a moot question.

We hear men complain constantly of a poor memory, of the inability to recall instantly a name or a source of information. Memory experts tell us that this problem is due mainly to the fact that we have not trained our memory to do its work. We neglect it, practically ignore it, then suddenly try to force it to perform an unaccustomed task.

On the other hand, when we are making no effort whatever to recall anything, names, places, and the most trivial of events often fall into our mental picture in complete and exact detail, almost as though we were reading the facts from a long-forgotten diary. Memory is certainly a remarkable faculty, and it deserves to be trained as well as a foundry apprentice—in fact, better than some of the apprentices I know.

Whether you rely on a good memory or on records that are clearly written and methodically preserved, you should have your information immediately available. This point is as important (or almost as important) for the sandman as it is for the bookkeeper. While the sandman doesn't have to balance books or split pennies, he should know something about the meaning of credit and debit, for the properties of his sand, whether retained or added, lean to one side or the other.

The man at the muller usually expects his daily production of system sand to maintain a uniformity within workable limits. By predetermined additions of water, clay, etc., desired properties are obtained and molding requirements are met. Let us assume that, at least for a brief period, no complaints arise from either molders or foreman. Both mold production and castings are satisfactory. The sandman exhibits that self-satisfied smile, and the millenium seems to have arrived.

This condition frequently proves to be the calm that precedes the storm! For several days the proportion of ingredients added at the skip-hoist or muller may have remained constant, but the returning sand from the shakeout refuses to remain constant. The sand itself may have been practically undamaged by its ordeal with molten metal, but clay, moisture and carboniferous matter all have undergone some degree of change, the degree depending on the weight of castings poured, temperature of metal, and time of solidification.

If this shakeout sand could be screened and blended prior to mulling, we might test it with some assurance of getting an average dependable reading. Undoubtedly this is what we all ought to do, but most of us do not have adequate facilities for such a program, and the prospect of such an investment appears frightening. So again, we turn as always to judgment born of experience, of trial and error, in which the memory of costly mistakes gives us no rest until a remedy is found.

Prior to the advent of mechanical aids, foundrymen had to be ingenious indeed to remain in business. I have never ceased to be amazed at the tricks employed, the subterfuge and artifice resorted to, in efforts to produce a saleable casting. In Turkey, I saw hand-grenade cores made with abominable molding sand, sawdust and water. Surely no American would even attempt it. Yet that in Turkey is know-how!

This hyphenated word is nebulous at best. I have seen castings made under the most primitive conditions that would do credit to any disciple

Saves 4 minutes per casting

ROTOR B-7 VERTICAL GRINDER pays for itself in 9½ weeks

JOB: Removing parting lines and general cleaning of large pipe fittings with disc cut-off wheel.

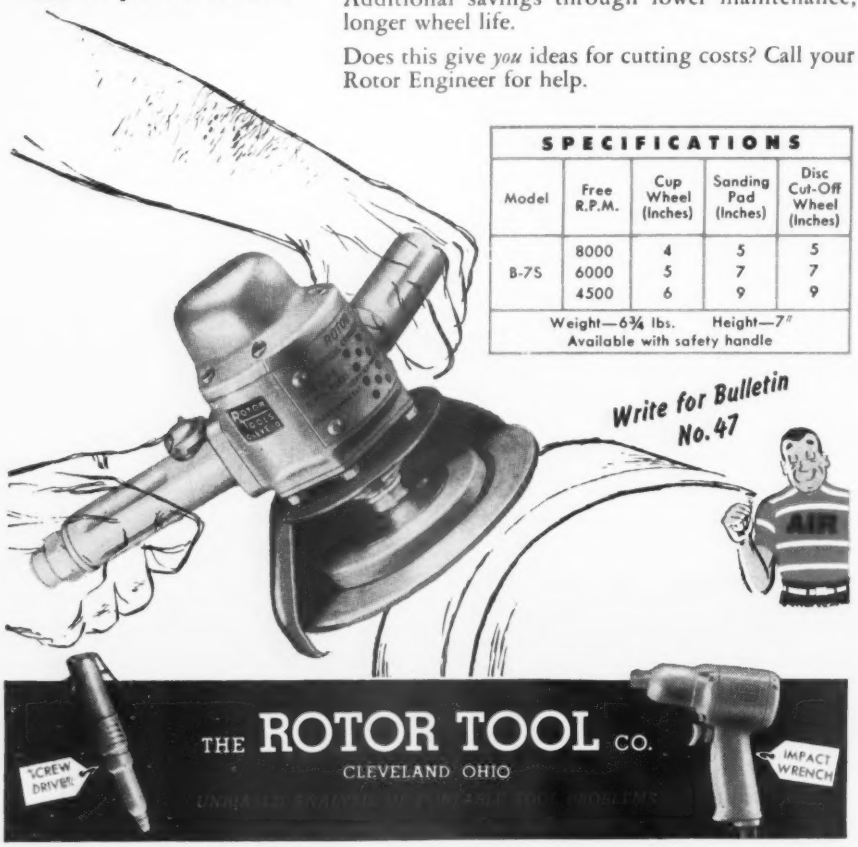
FORMERLY: An ungoverned, geared tool did the job . . . took 14 minutes per casting.

NOW: Lighter B-7 Vertical Grinder with direct-acting governor gives constant, controlled speed . . . cuts grinding time to 10 minutes.

RESULTS: Saves 4 minutes per casting. Used 75% of production time, tool paid for itself in 9½ weeks. Additional savings through lower maintenance, longer wheel life.

Does this give *you* ideas for cutting costs? Call your Rotor Engineer for help.

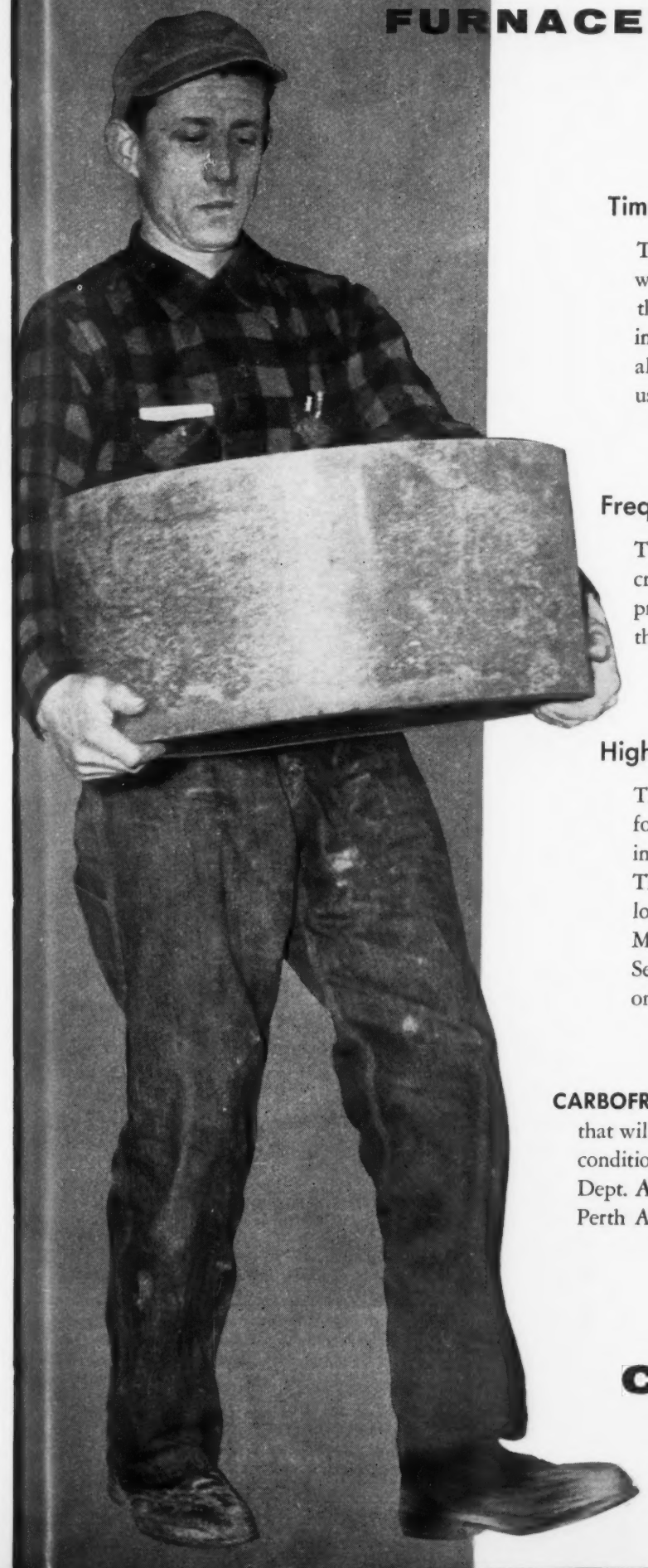
SPECIFICATIONS				
Model	Free R.P.M.	Cup Wheel (Inches)	Sanding Pad (Inches)	Disc Cut-Off Wheel (Inches)
B-7S	8000	4	5	5
	6000	5	7	7
	4500	6	9	9
Weight—6¾ lbs. Height—7" Available with safety handle				



THE ROTOR TOOL CO.
CLEVELAND OHIO

CARBOFRAX® rings plus ALFRAX® castable cement...

END THESE NONFERROUS FURNACE LINING PROBLEMS



Time-consuming installation . . . GONE

These CARBOFRAX silicon carbide rings are only 1½" thick; weigh about 70 pounds apiece. One man can place them in a furnace without a hoist. Complete relining job, including preparing and pouring the ALFRAX aluminum oxide castable cement back-up lining, usually takes about an hour and a half.

Frequent repairs . . . GONE

The silicon carbide rings resist flame erosion, spalling and cracking. They last many months with next-to-no patching; prevent cutting away or erosion of the insulating cement that backs them.

High fuel costs . . . GONE

The thin CARBOFRAX rings leave plenty of space for the ALFRAX cement, one of the most effective insulating materials ever developed for high temperatures. The ALFRAX insulation holds heat losses to a minimum . . . lower heat capacity furnace works faster with less fuel! Melting time is consistent throughout the day. Service records show many cases where operators report one to two extra heats per day!

CARBOFRAX linings are also available in segmental shapes that will fit any size crucible furnace. Let us know your operating conditions and we will be glad to make recommendations. Address Dept. A95, Refractories Division, The Carborundum Company, Perth Amboy, N. J.

CARBORUNDUM
Registered Trade Mark

Ideal for use in foundries and small metal producing plants, these machines provide exceptional economy and durability due to a unique design feature. The endless chain carrying the mounds runs over a series of "stationary wheels" mounted on the frame. This eliminates 80% of the moving parts. Results are increased capacity and a substantial reduction in maintenance and operating costs. Furnaces can be tapped direct into the machine—eliminating the furnace-to-ladle operation. Capacities: 3 to 50 tons per hour. Lengths: 15 to 125 feet, in multiples of 5 feet.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD PITTSBURGH 16, PA.

of the molder's art, and I have seen castings that were a disgrace to the industry born of the most modern technology. How do I explain it? Well, I should say that in the first instance, the primitive was art developed to a high degree, whereas the modern example was an attempted scientific approach, with understanding yet to be developed.

We have learned much about this business of making castings, but I am sure that no one will deny that we have much to learn. Emerson once observed that "all knowledge is correlative." Acting on this assumption, we should explore every avenue of possible information in our study of sand behavior. Remembering that it was from the investigation of clay properties that we became aware of the importance of the pH factor, we might do well to go farther afield attempting to uncover some of the additional secrets in the book of nature.

New York University Presents Lecture Series on Titanium

A total of 22 leading scientists and engineers will speak in a special one-week program of lectures on titanium at New York University, including William J. Kroll, inventor of the Kroll process for titanium extraction.

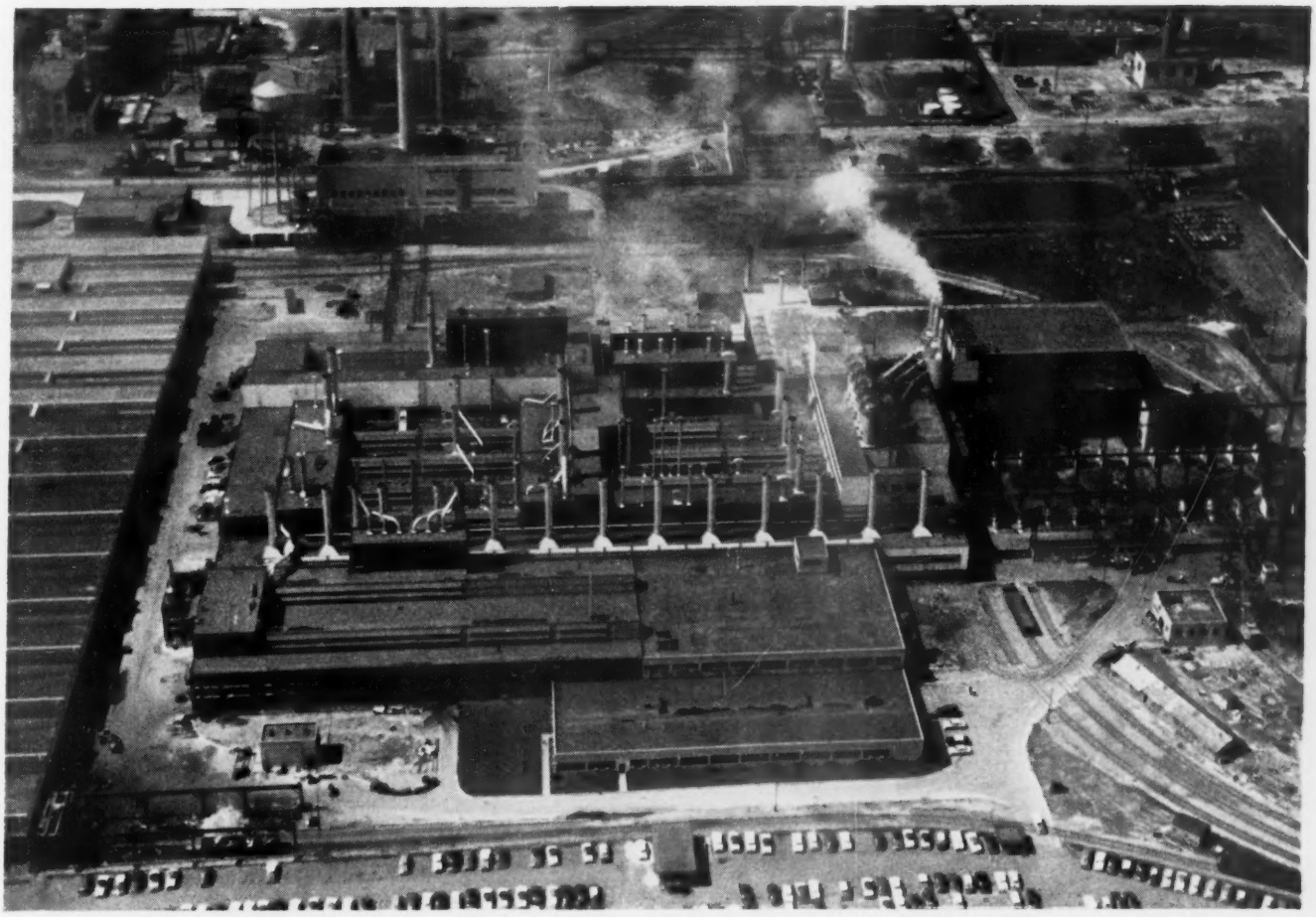
Especially designed for practicing engineers, the lecture series will be given Sept. 12-16 at the NYU College of Engineering. It is sponsored by the college's department of metallurgical engineering, the NYU Office of Special Services to Business and Industry and the American Society for Metals.

Applicants may register for one or more days of the series. Dormitory space will be available on the University Heights campus. Information may be obtained from Assistant Dean Wilbur K. McKee, NYU, 6 Washington Square North, New York 3, or from Dr. Harold Margolin, NYU College of Engineering, New York 53.

Offers Program Control Data

Methods and advantages of employing automatic, time-conditions control for many industrial processes and tests are described in a new bulletin published by the Industrial Division, Minneapolis-Honeywell Regulator Co. A "selection chart" aids the choice of the right instruments for any program control application. Copies are available from the company, at Wayne and Windrim Aves., Philadelphia 44. Request Bulletin 1130.

AIR VIEW of AIR MAKE-UP *by Koch*



AIR REPLACEMENT, FUME REMOVAL & EXHAUST SYSTEMS ENGINEERED, FABRICATED & INSTALLED *by Koch*

Exhaust stacks rising from this modern foundry landmark another installation of air handling equipment by KOCH.

For this foundry, KOCH installed hoods for the pouring and shake-out lines . . . exhaust for smoke and fume removal . . . fresh air over the mold lines and stacks and intakes over the castings cooling court.

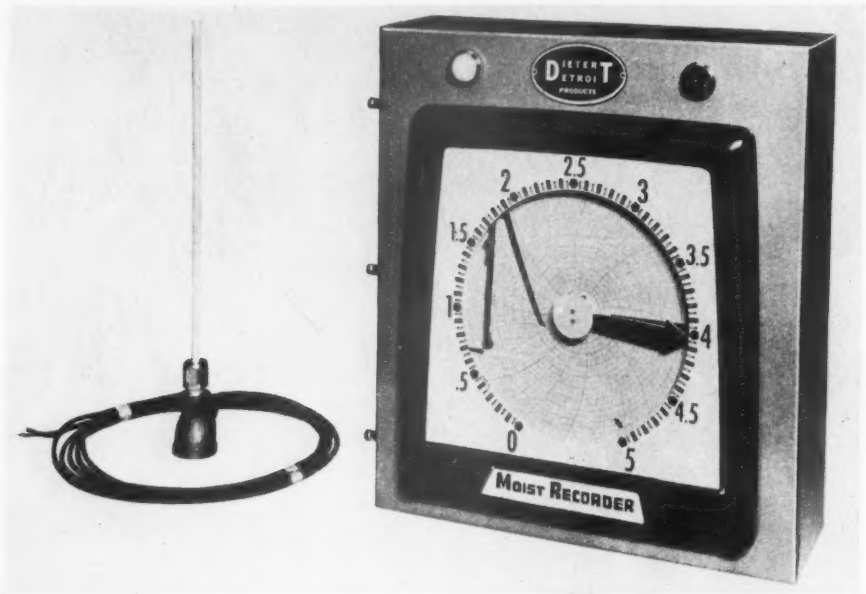
KOCH engineers are available for consultation, design and preliminary estimates at your request. KOCH handles the complete responsibility — from design through detailing, fabrication and installation.

WRITE FOR BULLETIN C9-M10

GEORGE KOCH SONS, INC.

EVANSVILLE, INDIANA

New Equipment and Supplies



Sand Moisture Tester: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.—Unit continuously tests and records moisture content of foundry sand in a bin or hopper or traveling on a conveyor. Compact and self-contained, the unit consists of a high-frequency capacitance bridge, a moisture probe and either a circular or strip chart recorder. It is equipped with two lights to indicate when the sand runs above or below the desired moisture content. Audible alarms also can be furnished to signal "out-of-range" moisture.

For More Details Circle No. 1—Page 281

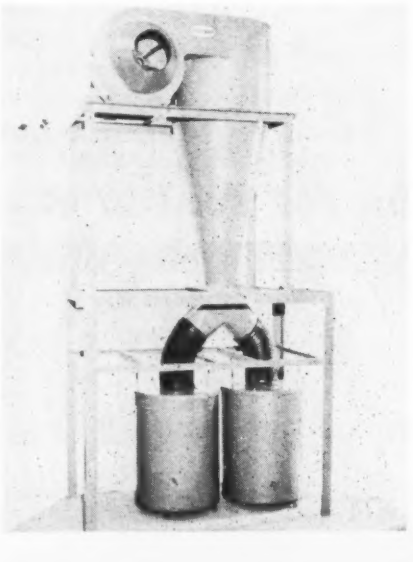
Refractories: Richard C. Remmey Son Co., Hedley St. and Delaware River, Philadelphia 37, Pa.—Line of refractories is for use in nonferrous foundries, primary steel production, glass furnaces, ceramic kilns and power plants. Several grades of the synthetic mullite refractory are available in form of bricks, special shapes and ramming mixes. Manufacturer claims processing techniques provide these advantages: Extremely stable refractory qualities up to and including 3326° F; high resistance to thermal spalling; high resistance to structural spalling, and high resistance to deformation at high temperatures.

For More Details Circle No. 2—Page 281

Belt Lubricator: Manzel, 315 Babcock St., Buffalo 10, N. Y.—Automatic lubricator for abrasive grinding belts consists of an adjustable stroke pump driven by a reciprocating air motor and incorporates a spray control cylinder that triggers air only when fluid is being delivered to the spray nozzle. Controls regulate frequency of application, amount of lubricant pumped per stroke and air pressure at the nozzle.

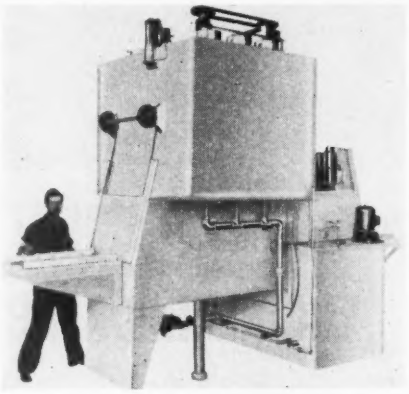
For More Details Circle No. 3—Page 281

Dust Collector: Aget Mfg. Co., Adrian, Mich.—Dust collector for use where large dust storage capacity is necessary has an air handling capacity of 3600 cu ft of air per minute, with a static pressure of 6 in. of water. Capable of collecting dust from almost any dust-creating machine or operation, especially where volume runs high, the unit eliminates need to empty a dust bin with a shovel. For simplified emptying and maintenance, two rubber-castered, roller dust cans are connected to the collector by an all-metal diversion Y. Unit is available as a recirculating unit or with attachments for outside exhaust.



For More Details Circle No. 4—Page 281

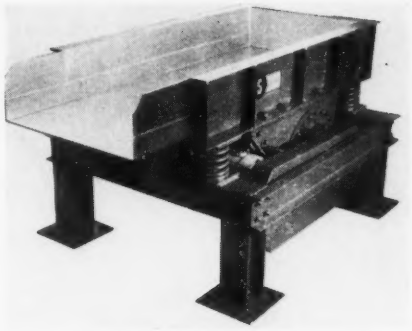
Heat Treating Unit: Denver Fire Clay Co., Industrial Furnace Dept., 2321 Blake St., Denver 5, Colo.—Forced convection heat treating unit is designed for hardening, carburizing, carbonitriding, martempering and similar applications. It is a semiautomatic controlled atmosphere furnace embodying a bottom charging design. Furnace and quench chambers never are open to room atmosphere during operation. This feature is said to assure maximum uniformity of results, minimum distortion and bright, scale-free finish. Because the unit is pushbutton controlled and pneumatic powered, it can be changed over quickly from one heat treating process to another. Timing and transfer are automatic from charging door to unloading door. As soon as one load reaches the quench chamber, another can be started into the furnace.



For More Details Circle No. 5—Page 281

Oscillating Feeder: Simplicity Engineering Co., Durand, Mich.—Oscillating feeder is designed to handle a heavy column load. Oscillating action is provided by two eccentric shafts which may be timed to vary the feeder action from vertical to horizontal. The unit feeds along its entire length, allowing use of a large hopper opening and eliminating problem of material bridging in

For More Details on These Items
Use Reply Card—Page 281



the hopper. Overloading the feeder is said to cause no damage because eccentric shafts and feeder pan are not connected mechanically. Timing of shafts may be changed or the entire assembly replaced in 30 minutes. The feeder may be spring mounted or provided with a spring and cable arrangement for hopper suspension. It will feed on the horizontal. Sizes available range from 1 x 4 ft to 6 x 20 ft, with capacities from a trickle to 1000 tons per hour.

For More Details Circle No. 6—Page 281

Platen Grinder: Curtis Machine Co., Jamestown, N. Y.—Platen grinder employs serrated contact belt and contact roll for grinding and polishing flat and radius surfaces. Grinder, developed in collaboration with Carborundum Co., uses a 175-in.-long contact belt behind a 226-in.-long abrasive belt. Serrations on the contact belt flex coated abrasive belt, setting up a fast cutting action and greater chip clearance maintaining clean, cool, cutting efficiency. Serrated contact belt absorbs the friction against steel platen and leaves the abrasive belt free to do its abrasive job.

For More Details Circle No. 7—Page 281

Air Filter: Engman Mfg. Co., 1317-19 Locust, Des Moines, Iowa—Fully automatic air filter weighs 28 oz and is equipped with an automatic discharge to eliminate hand draining. The filter is said to offer positive prevention against water, grit, scale and sludge in air for air-operated tools. Each filter is stamped with its recommended capacity in cubic feet per minute at 100-lb pressure. Under normal conditions, no maintenance is required.

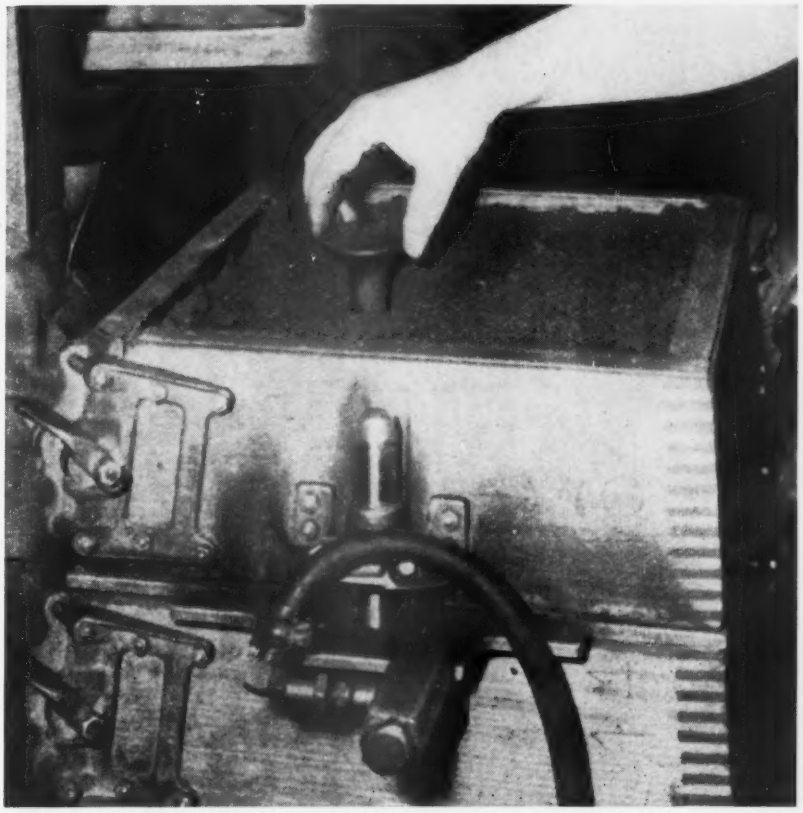
For More Details Circle No. 8—Page 281

Sonic Analyzer: Kinetic Instrument Co., 3250 Skokie Valley Rd., Highland Park, Ill.—Sonic analyzer is for nondestructive testing of solid and visco-elastic materials. It measures effects of natural or induced deterioration, flaws or inclusions or product uniformity. It is designed for laboratory use, field testing or production quality control. The unit permits sonic testing of metals, plastics, brick, carbon, graphite, adhesives, abrasive wheels, wood and glass. It meets ASTM specifications for testing concrete.

For More Details Circle No. 9—Page 281

Safety Crane Hook: Walpole Co., 419 Boylston St., Boston 6, Mass.—Positive locking safety crane hook completely encloses sling at all times. Pressure of sling forces the open side of body to close completely, with a spring loaded safety catch making a positive lock at the neck. Under factory tests, the hook could not be opened in use, even under swinging loads, according to the manufacturer;

Sprue Former Makes Sprues Automatically

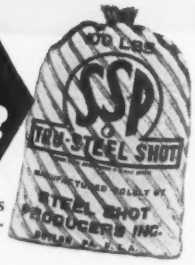


SPRUE FORMER made of rubber is said to increase production by eliminating manual cutting of sprues. Scrap caused by loose sand washed down the sprue into the mold cavity is avoided. The device is self-releasing and can be removed rapidly. It automatically forms the pouring basin and downsprue by compression. When compressed, the unit provides uniform 360-degree expansion from top to bottom, it is claimed. Upon release of the pressure, it returns to its original size and shape, thus providing a downsprue with a hard, smooth surface. Using the device involves tapping the pattern at the desired sprue location and inserting a ⅛ x 1-in. steel pin. The device is placed on the pin, and the mold is made. Standard lengths available are 4½ and 6½ in. Manufacturer of the sprue former is Keson Industries, P. O. Box 11, Berwyn, Ill.

For More Details Circle No. 10—Page 281

Do you want an abrasive that...

LASTS LONGER?

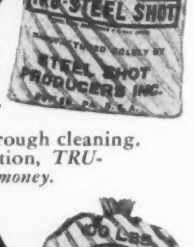


TRU-STEEL does because it is scientifically heat-treated, then drawn to precise tolerances. Thanks to its durability, *TRU-STEEL saves you money.*

SAVES PARTS?

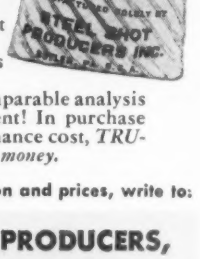
TRU-STEEL will not break into fines that cause wear of machine parts. Cutting down-time and parts replacement, *TRU-STEEL saves you money.*

CLEANS FAST?



Controlled chemistry and careful control checks give TRU-STEEL the exact hardness for fast, thorough cleaning. Speeding production, *TRU-STEEL saves you money.*

COSTS LESS?



In sizes most popular for blast cleaning, TRU-STEEL costs less than any other steel shot of comparable analysis and heat treatment! In purchase price, in performance cost, *TRU-STEEL saves you money.*

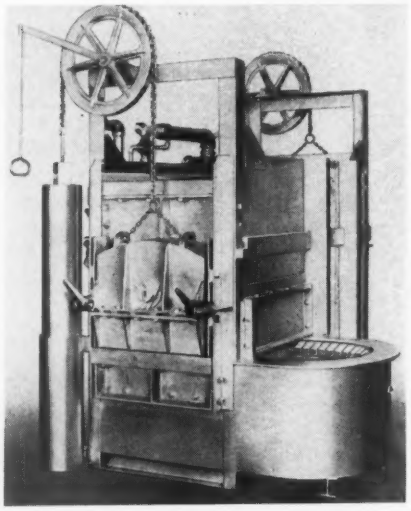
For full information and prices, write to:

STEEL SHOT PRODUCERS, INC.
BUTLER, PA.
Subsidiary of Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

a 3-ton and 10-ton size are available, both guaranteed with a safety factor of 4.

For More Details Circle No. 11—Page 281

Reverberatory Furnaces: Johnston Mfg. Co., 2825 East Hennepin Ave., Minneapolis 13, Minn.—New line of reverberatory furnaces offers capacities ranging from 400 to 2000 lb per hour. All metal parts exposed to direct flame or radiation



are of cast iron. Temperatures are controlled automatically in the breakdown and holding chambers. Linings are reported to be of high quality refractory brick.

For More Details Circle No. 12—Page 281

Air Control Valves: Logansport Machine Co., Logansport, Ind.—Three air control valves have been added to company's line. One is a solenoid bleeder, air cylinder actuated, two- or three-way valve, side or base mounting, for electrical pushbutton, limit switch, timer, etc., control of bleeder and pilot-operated master valves. Another model has same features except it has two exhaust openings which permit bleeding both ends of master valve alternately.Third model is a four-way, two-position valve designed for side or base mounting and is electric pushbutton, limit switch, timer, etc., controlled for operating double-acting air cylinders.

For More Details Circle No. 13—Page 281

Sandpaper: Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.—Mesh-type, waterproof, coated abrasive resists filling and loading and is composed of a cloth mesh coated on both sides with mineral grains bonded to cloth with a heat-resistant, waterproof resin. Aluminum oxide or silicon carbide mineral coatings are available for either wet or dry sanding, by hand or machine. Grits from 100 to 400 can be supplied. Roll sizes run to 2½ in. wide. Disc sizes include up

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81. Core and Mold Ovens

Carl Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.—Bulletin 53CM illustrates core and mold oven installations throughout the country. Diagrams, construction features, operating principles and advantages of rack, car, vertical, horizontal monorail, rolling drawer, portable and special ovens, ingot mold dryers and heat treating furnaces are included.

82. Snagging Wheels

Gardner Machine Co., Beloit, Wis.—Bulletin describes made-to-order service of manufacturing resinoid-bonded snagging wheels tailored to individual jobs. Application determines the wheel to be used, and wheel for that job is made only after development of a specification for a particular need.

83. Turbo-Compressors

Spencer Turbine Co., Hartford 6, Conn.—Bulletin 126-A covers construction features, design data, pressure ratings and applications of line of centrifugal type turbo-compressors for use for oil and gas fired equipment, cupolas and special uses where high volume and low pressure air is required.

84. Cupolas and Chargers

Modern Equipment Co., 300 Springer Ave., Port Washington, Wis.—Functional drawings, application photographs, specifications, lining requirements and other engineering information on cupolas, ladles, forehearths, cupola chargers, charging buckets, weigh hoppers and cranes are found in bulletin 147-A.

85. Flexible Hose

Flexaust Co., Division of Callahan Zinc-Lead Co., 100 Park Ave., New York 17, N. Y.—Bulletins 40, 41, 42, 43 and 44 are available as a set and contain general information, accessories, installation, application, friction loss and other data on flexible hose for use in dust and fume control, air conditioning and materials handling.

86. Liquid Blast Cleaning

Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Bulletin 1403 contains photographs, detailed drawings, dimensions, sizes and features of several models of liquid blast cleaning equipment for use in deburring, surface finishing or surface preparation for coating, die and mold maintenance and general maintenance.

87. Induction Furnaces

Ajax Electrothermic Corp., Ajax Park, Trenton 8, N. J.—Converter type induction furnaces are covered in bulletin 14-B. Basic advantages of induction melting are listed along with a table of melting performances for various metals and dimensioned drawings of furnaces with varying capacities.

88. Shell Machine

C & S Products Co., 14841 Meyers Rd., Detroit 27, Mich.—Bulletin CS-15 contains specifications and illustrations of the operating cycle of an automatic, two-station rotary-operated shell machine that can blow shell molds or shell cores at the rate of one about every 20 seconds.

89. Air-Line Lubricators

Ingersoll-Rand, 11 Broadway, New York 4, N. Y.—Form 4169 describes air-line lubricators for use with the smallest hand-held air tools to the largest type drills. Table is provided to help the user select the proper size lubricator for his machine or unit.

90. Cast Iron Pots

ACF Industries Inc., Industrial Products Division, 30 Church St., New York 8, N. Y.—Folder lists sizes and shapes of standard nickel-

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chromium cast iron melting or holding pots for applications in aluminum foundries, die casting plants and smelting operations. Special sizes and shapes also are available.

91. Pressure Gage

W. C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif.—Bulletin PG-4 offers general information and application photographs of compact instrument designed to measure mechanical pressures or compressive loads in limited space. Instrument can be used alone or can be incorporated directly into special testing machines.

92. Electric Hoists

Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Division, Muskegon, Mich.—Bulletin 410 describes series of two-speed push-button control electric hoists in capacities from ½-ton up that are reportedly ideal for accurate handling to set cores, draw patterns and close flasks.

93. Speed Variator

Cleveland Worm & Gear Co., 3249 East 80th St., Cleveland 4, O.—Descriptions, ratings, dimensions and other engineering data on line of drives that provide infinitely variable output speed over a range up to 9:1 from a constant-speed power source are contained in bulletin K-200.

94. Heat Treating

Ipsen Industries Inc., 715 South Main St., Rockford, Ill.—Bulletin T-40 includes descriptive drawings, photographs and text covering operation and specification of series of heat treating units with controlled atmosphere cooling.

95. Shell Mold Resin

Reichhold Chemicals Inc., 525 North Broadway, White Plains, N. Y. —Technical bulletin F-6 presents the composition and discusses advantages of using a liquid, water-soluble phenolic resin for blowing shell molds.

96. Aluminum Alloy

William F. Jobbins Inc., P. O. Box 230, Aurora, Ill.—Physical properties, composition, specifications and applications for a high-purity virgin aluminum alloy of the aluminum-magnesium type are contained in bulletin 354.

97. Roof Ventilators

Hartzell Propeller Fan Co., Piqua, O.—Dimensions, specifications and performance data on line of roof ventilators are found in catalog A-112.

98. Fire Brick

North American Refractories Co., Cleveland 14, O.—Bulletin 101C outlines applications and uses for three brands of super duty fire brick engineered to resist a combination of severe conditions found at high temperatures.

99. Dock Levelers

Wayne Pump Co., Industrial Division, Ft. Wayne, Ind.—Form WI-017 presents schematic drawings and application photographs of dock levelers engineered to speed loading and unloading operations, increase volume per man hour, eliminate handling and reloading and prevent accidents and injuries at the loading platform.

100. Vibrating Screens

Deister Machine Co., 1933 East Wayne St., Fort Wayne 4, Ind.—Bulletin 54 illustrates and describes a heavy-duty vibrating screen featuring positive, opposed elliptical throw action to control movement of material on the screen and increase efficiency in sizing.

101. Materials Handling

Cleveland Tramrail Division, Cleveland Crane & Engineering Co., 8086 East 289th St., Wickliffe, O.—Advantages, design features, engineering and application data on line of overhead materials handling equipment are included in booklet 2008.

102. Air Compressors

Joy Mfg. Co., Henry W. Oliver Blvd., Pittsburgh 22, Pa.—Bulletin A62 contains cut-away cross-sectional drawings, engineering data, design features and specifications on several types of air compressors and accessories.

103. Annealing Pots

Decatur Foundry Inc., P. O. Box 1344, Decatur, Ill.—Illustrated folder contains information on styles and sizes of annealing pots available for use in malleable foundries. A variety of sizes and capacities can be supplied.

104. Heat Equipment

Thermal Research & Engineering Corp., Conshohocken, Pa.—Specialized heat equipment, including ladle heaters, using gas, oil or combination gas and oil burners are illustrated and described in bulletin 108.

105. Ball Bearing Trolleys

Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.—Catalog 2536 contains dimension and application data along with pictures and descriptions of line of ball bearing trolleys for overhead conveyors.

106. Foundry Ovens

Despatch Oven Co., 619 South East Eighth St., Minneapolis 14, Minn.—Charts, engineering data, descriptions and illustrations of line of foundry ovens of varying design are contained in bulletin 40.

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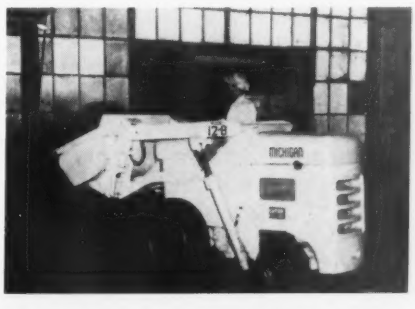
For More Details Circle No. 14—Page 281

Hand Torch: Maxon Premix Burner Co., Muncie, Ind.—Lightweight, portable, gas-fired hand torch is designed for use in skin drying sand molds and can be used on large floor molds by working inside the mold or turning it on its side for accessibility. Torch can be used also to dry or preheat ladles, preheat dies and in core pasting. Available in three styles for use with either low or high pressure gas, the torch weighs 9 lb. Compressed air in the range of 5 to 60 lb. pressure is required for use with low-pressure gas, and air consumption runs from 2 to 3 cfm. Heat release from the low pressure type ranges from 210,000 to 500,000 Btu per hour.

For More Details Circle No. 15—Page 281

Tractor Shovel: Construction Machinery Division, Clark Equipment Co., Benton Harbor, Mich.—Features of a 15-cu-ft tractor shovel for in-plant handling of bulk materials include power-shift transmission, torque converter with 3 to 1 torque multiplication, planetary wheel axle and low-level bucket action. Transmission, torque converter, starting motor, distributor and generator are sealed, and filters are provided for transmission, torque converter and engine lube oil. Designed to facilitate movement in and out of boxcars and along narrow



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aisles, the unit is 4 ft, 2 in. wide. The bucket will handle 1500 lb at 5.6 mph. It tips back 38 degrees at a carrying height of 4 in. and 48.5 degrees at the 5-ft maximum dumping height. The machine weighs 6250 lb and is available with either a 4-cylinder, 36-hp gasoline or 42-hp diesel engine.

For More Details Circle No. 16—Page 281

Thermocouple Tester: Robertshaw-Fulton Controls Co., Robertshaw-Thermostat Division, Youngwood, Pa.—Combination thermocouple

and temperature tester is designed for checking the milli-voltage output of thermocouples in both open and closed circuits, from 0-50 and 0-100 in either single or multiple installations. Temperatures of ovens, dryers, heaters, and heat treating installations up to 650° F also can be checked. The tester is said to compensate automatically for changes in ambient temperature.

For More Details Circle No. 17—Page 281

Dual Lift Platform: Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa. — Special dual lift platform truck is fitted with two independently operating platforms which can be separated to a maximum vertical distance of 62 in. Upper platform fits over the lower one in its lowered position, giving the appearance of a single platform lift truck. Platform dimensions are: Upper, 69 x 24 in. and lower, 53 x 21½ in. Upper platform provides a free lift of 35 in. with a maximum of 69, while the lower can lift a skid 4½ in. Over-all height is 60 in. Each platform can handle a 2000-lb load.

For More Details Circle No. 18—Page 281

Generators: New Rochelle Tool Corp., 322 Main St., New Rochelle, N. Y.—High-frequency generators for induction and dielectric heating have cubicles 26 in. wide that open on two or three sides for servicing. Motor generators provide frequencies to

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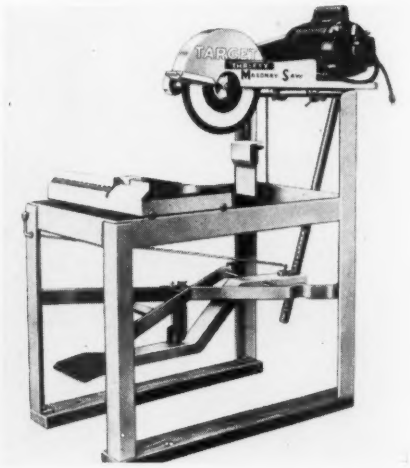
For More Details Circle No. 19—Page 281

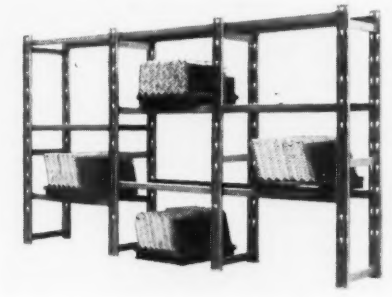
Masonry Saw: Robert G. Evans Co., 7204 Wyandotte, Kansas City 14, Mo.—Full size masonry saw features dual voltage switch to convert in-



stantly its 1½-hp, totally enclosed motor from 110 to 220 volts. Saw is available as a wet or dry cutting unit. A wet cut kit converts the dry saw to full wet cutting. An angle-set mechanism permits operator to angle the cutting head from any size material for any kind of cut. Cutting head is removable for portability.

For More Details Circle No. 20—Page 281

Storage Racks: Palmer Shile Co., 16033 Fullerton, Detroit 27, Mich.—Adjustable storage racks feature double slots set at an angle on the



vertical uprights to provide rigidity and prevent swaying. Adjustable members may be removed by hand and placed at any desired level. Complete tiering range is possible, using racks in single, double or multiple sections. Units are made to customer's specifications.

For More Details Circle No. 21—Page 281

Hard-Facing Wire: Stoody Co., Slauson Ave. at Sorenson, Whittier, Calif.—Tubular fabricated alloy wires designed for open arc application through standard semiautomatic welders require no flux and offer the

versatility of manual welding with the control of the full automatic. A 50 per cent high-chromium hard-facing alloy, a 20 per cent alloy for hard-facing and a Hadfield nickel-manganese for build-up of manganese steel parts are available. As wires are bare, they are about 90 per cent efficient with no slag removal problem, according to manufacturer.

For More Details Circle No. 22—Page 281

Ladder-Level: H-B Industries Inc., 1401 Middle Harbor Rd., Oakland, Calif.—Safety device to eliminate most of the accidents commonly associated with use of ladders can be attached to any ladder. Its self-adjusting legs adapt themselves to any terrain and permit the ladder to stand upright. Slipping is prevented by nonskid, swiveling feet.

When user puts his feet on first rung, the mechanism locks automatically and can be unlocked only by hand.

For More Details Circle No. 23—Page 281

Combustion Safeguard: Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill.—Combustion safeguards are manufactured in two series, one based on the flame rectification principle, the other on use of a lead sulphide cell responsive to infrared as a detection element. All models are housed in cabinets and incorporate a plug-in type chassis. Features include a safety-type terminal strip, convenient checking strips, standard electronic tubes and heavy-duty construction. All conventional-type sensing systems are used in conjunction with the units.

For More Details Circle No. 24—Page 281

Microscope: William J. Hacker & Co., 82 Beaver St., New York 6, N. Y.—Incident light microscope reportedly enables user to inspect surface and structure of metals, minerals, textiles or other materials. Optics are twin objective with swing-out

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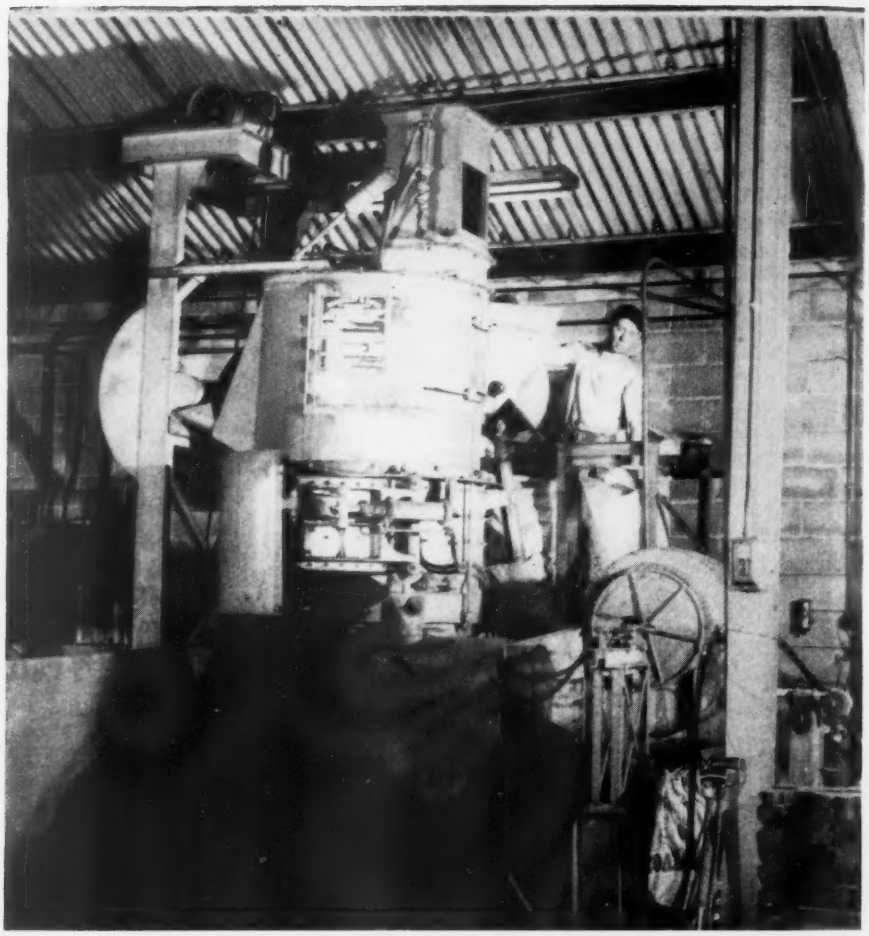

$60.00 A DAY is saved with this new Model "40-60" Speedmullor-Preparator Unit at the nine-molder Kelly Foundry & Machine Company, Elkins, West Virginia. With this low-cost unit, one man handles all the shakeout sand, delivers it to the Preparator, thoroughly conditions and mulls it in the unit, and returns the mulled sand to the molding floors. In addition to direct labor savings in the foundry, cleaning room costs are lower, casting losses are reduced, and the foundry has the advantage of better castings and a controlled operation. The unit is paying for itself in less than a year. *For full data write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

AN AUTOMATIC FLASK EQUALIZER and clamp and draw arrangement allows fast clamping of molds of various heights and automatically compensates for mold height irregularities on this J&J 920 Rol-A-Draw at Service Foundry of New Orleans. The Rol-A-Draw is part of a fast Slinger-Rotomold Unit that handles the foundry's jobbing work on a production basis. *For the full story of Service Foundry write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

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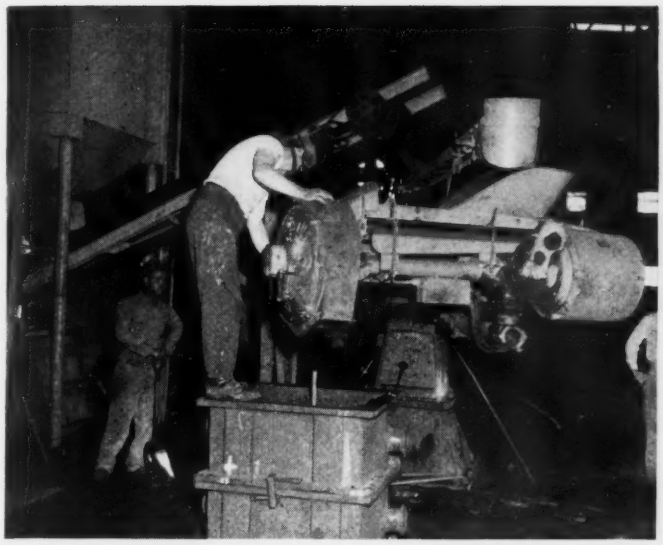

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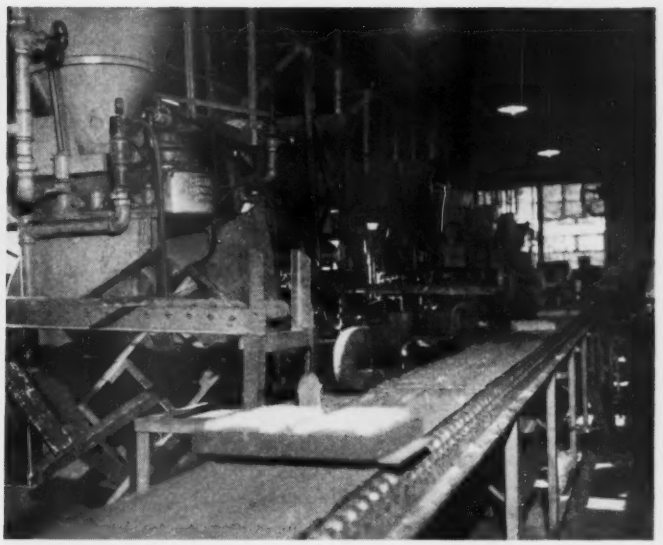

FOUR CHAMPION CORE BLOWERS in the core room of Texas Foundries, Inc., at Lufkin, Texas are doing a real job. There, in the largest Malleable Foundry in the South, Champion Flexiblos have proved valuable because of their outstanding ability to handle a wide range of different jobs and all types of core boxes . . . vertically-split, horizontally-split or open-face. *For the latest information write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

A MODEL "60" SPEEDMULLOR at the Texas Foundries, Lufkin, Texas, mulls the oil bonded core sand for this malleable foundry's modern core room. The sand is thoroughly mulled to exacting specifications in one-and-a-half minute total mullling cycles. Loading is conveniently accomplished by Speedmullor Skiphoist. *Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill. will provide full data.*

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Write for your copy today. Of special interest to production officials, this book shows latest developments and application of Trolley Conveyors. Profusely illustrated, an informative catalog. Whether or not you contemplate using Trolley Conveyors at this time, you will wish to have this book in your files. Write today for your copy—no obligation.

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Logan Conveyors

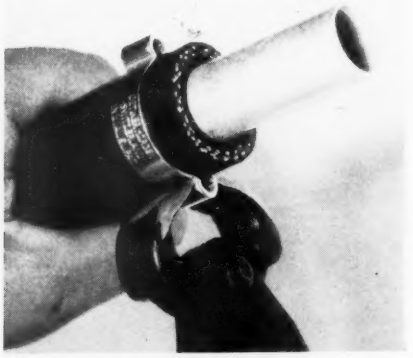
element, initial magnifications 5X and 10X. Huyghenian eye piece of 5, 10 or 15X or a measuring eye piece of 10X can be supplied. Built-on adjustable low voltage lamp with 6-v bulb provides illumination. Unit can be used with 110 or 220 v current.

For More Details Circle No. 25—Page 281

Imprinted Towels: Industrial Wiping Cloth Co., 29-28 51st Ave., Long Island City 1, N. Y.—Safety slogans imprinted on company's shop towels serve as constant reminders in promoting safety at the workman level. Towels have smoothly bound edges that reportedly cannot fray. They are said to be of even weave and uniform size with high absorbency quality. Towels are rented from industrial launderers.

For More Details Circle No. 26—Page 281

Hose Clamp: Circle Clamp Corp., 39 Broadway, New York 16, N. Y.—General-purpose hose clamp reportedly can be fixed in place in three seconds with ordinary pincers. Simplified application of one-piece clamp is



said to save on both clamping time and costs. Clamp is rounded with U-shaped folds or lugs. Smaller size clamps have two lugs, the larger ones three. Device is slipped on hose or part and crimped in place by squeezing parallel sides of the lugs. Clamps are made from various ferrous and nonferrous metals in 20 sizes ranging from ¼ in. ID to 2⅝ in. ID. Larger sizes are produced on request.

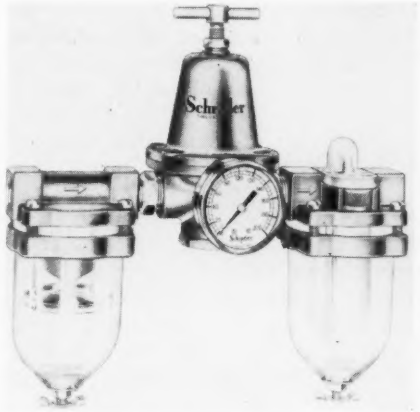
For More Details Circle No. 27—Page 281

Movable Fire Wall: Building Panel Division, Detroit Steel Products Co., 3533 Griffin St., Detroit 11, Mich. — Light-gage steel, movable wall for use as an interior partition has an approved 2 hour and 35 minute fire rating. Wall can be moved and set up in new plant locations to permit rearrangement of assembly lines, machinery and equipment. Wall is made of 19-gage steel panels with 4-in. incombustible gypsum board core. Panels, 2 ft wide and up to 30 ft long, allow fast disassembly. When assembled the wall presents a 5½-in.,-

thick curtain fire barrier. Paint can be added directly to the wall if desired.

For More Details Circle No. 28—Page 281

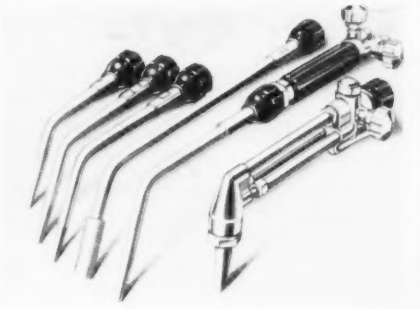
Air Filter: A. Schrader's Son, Division Scovill Mfg. Co., 470 Vanderbilt Ave., Brooklyn 38, N. Y.—



Combination air filter, regulator and lubricator for air-operated tool is fully automatic and can be cleaned and serviced without removal from the pipe line. It features a large-area sintered bronze filter, baffle plate and draincock for blowing out water and accumulated foreign matter. Turning the regulator handle adjusts the air flow from 250 psi inlet pressures down to 5 to 125 psi. A vibration-proof adjustment thumb wheel on the lubricator unit regulates oil flow from a steady flow down to intermittent drops, as needed. A "sight feed" permits users to see that oil is flowing in desired quantities. Unit is available in three sizes, ¼, ⅜ and ½-in. N. P. threads.

For More Details Circle No. 29—Page 281

Oxy-Acetylene Torches: Marquette Mfg. Co., 307 East Hennipin Ave., Minneapolis, Minn.—Oxy-acetylene torches for heavy, medium and light duty are said to have these advantages to make torch operation easier: Aluminum handles reduce weight by one-third; stainless steel torch head keeps handle cool by blocking heat generated in the tip; precision ground, stainless steel needle valves with spring loaded telescoping valve heads control gas flow



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MOIST RECORDER

1. No other single factor causes more variation in molding conditions and casting quality than fluctuations in the moisture content of molding sands.
2. The MOIST RECORDER tests and records the moisture content of sand in bin, hopper or on a moving conveyor. It doesn't miss a batch.
3. A continuous record gives your foundry an exact basis for correlating moisture variations with casting results.
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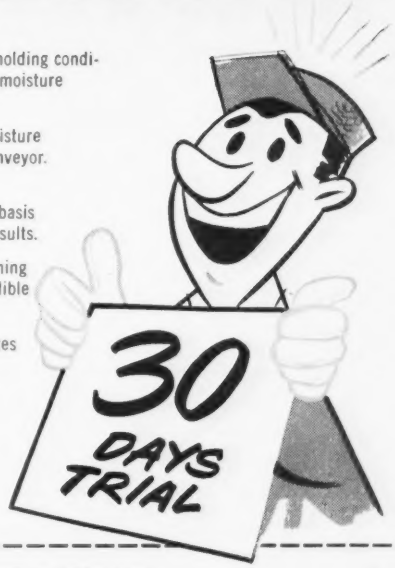
5. The DIETERT-DETROIT MOIST RECORDER utilizes the proven, reliable high frequency capacitance method of moisture measurement. The unit is self-contained, compact, easily installed.



So confident are we that you will be completely satisfied with the benefits obtained, that we offer the MOIST RECORDER on a 30-day trial basis, without obligation.

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Rush me details on the Moist Recorder and your 30-day trial offer.

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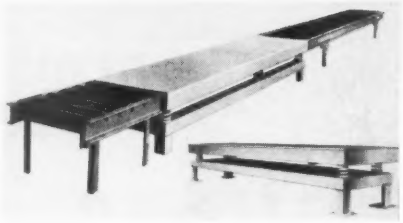
and welding tips, and cutting assemblies attach to handle with finger-twist pressure.

For More Details Circle No. 30—Page 281



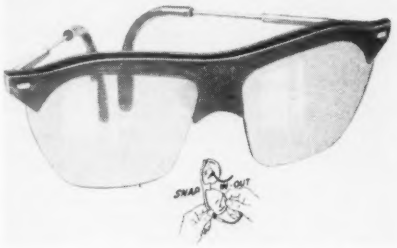
Vibrating Table: Cleveland Vibrator Co., 2828 Clinton Rd., Cleveland 13, O.—Electrically-powered vibrating table is incorporated into a roller conveyor system and used for compacting, settling and filling operations. Unit consists of two cam shaped weights attached on each end of an electric motor. As motor revolves at top speed, the centrifugal force on the lop-sided weights vibrates table 3600 times per minute. Assembly is sealed against dirt and dust, and there are no belts, pulleys or reciprocating parts to wear out. Steel tables are made to order and are available with steel or wood tops and either steel spring or sponge rubber inserts.

For More Details Circle No. 31—Page 281

Sensitive Paint: Tempil Corp., 132 West 22nd St., New York 11, N. Y.—Temperature-sensitive paint undergoes color changes from mustard yellow to maroon in five minutes at 400° F. It has found an application on mixing tanks in steel plants in providing forewarning of the wearing down to thin layers of the fire brick lining. Paint is brushed or sprayed on the outside shell of mixer and allowed to dry. When the lining becomes excessively worn, temperature rises, and the coating provides a warning by changing its color. Material is made with a silicone resin base for high-temperature service. Color transformation will develop slowly at lower temperatures, but no permanent color change will take place below 375° F, according to manufacturer.

For More Details Circle No. 32—Page 281

Safety Spectacles: Watchemoket Optical Co., 232 West Exchange St., Providence 3, R. I.—Interchangeable lenses can be snapped into place



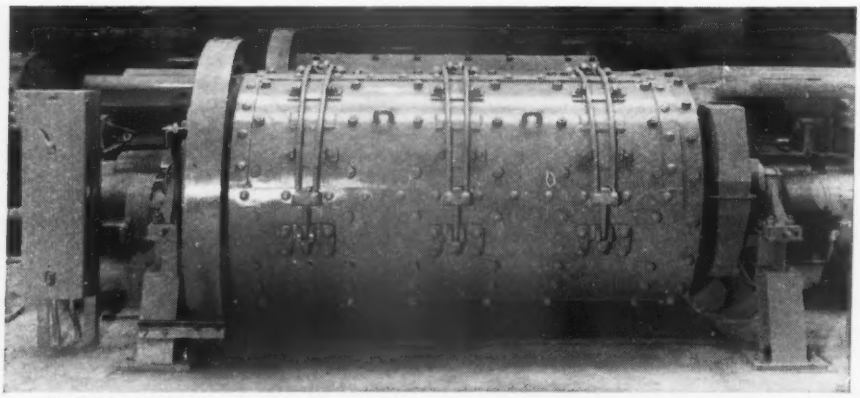
without tools to permit safety spectacles to serve more than one purpose. Clear, light green, medium green, and gold lenses of shatterproof methacrylate can be supplied. Lenses are curved and oversize for protection. Frame is curved to form-fit the forehead. Each pair of spectacles has its leatherette case large enough to hold extra sets of lenses.

For More Details Circle No. 33—Page 281

Motor Brake: Cleveland Electric Motor Co., 5213 Chester Ave., Cleveland 3, O.—Mechanical motor brake is built into motor frame and enclosed in the housing. Cells and solenoids are eliminated. Brake allows for quick opening and avoids sudden impact on stopping. Tension springs can be adjusted for rapid or slow stops. Brake assembly is provided with fans for temperature control.

For More Details Circle No. 34—Page 281

Thread Inserts: Heli-Coil Corp., Danbury, Conn.—Company has added inserts for left-hand threads in sizes 7/16-20 and 1/2-20 to its line of 47



Sly Tumbling Mills clean automotive castings fast and at lower cost.

castings cleaned RED HOT

cleaning costs slashed!

With Sly Tumbling Mills, operators are cleaning castings right out of the shakeout, without worry about temperature — and, at the same time, reducing costs up to 75%. *No other cleaning method can do this.*

Today, due to the increasing use of shell molded castings and other methods, castings are much cleaner than formerly. Foundry executives are way ahead cost-wise by using Sly Tumbling Mills instead of expensive blast cleaning equipment. They find big savings, too, in the complete cleaning that results.

Sly Tumbling Mills Bring All These Savings

- Clean thoroughly . . . save hours and hours of grinding time by *eliminating fins as they clean.*
- Clean all castings at once — no individual handling of pieces.
- Do a perfect job on shell molded castings where surfaces need improving.
- Permit use of unskilled labor during an evening shift or after shakeout, using the shakeout gang to load and unload mills.

These savings are important! May we send complete information?

Manufacturers and Designers of: Dust Control Systems, Blast Cleaning Equipment, Tumbling Mills, Industrial Ovens.

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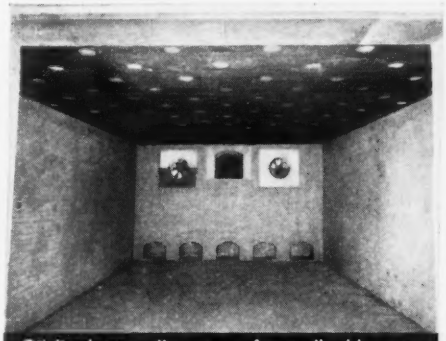
IMPROVED annealing cycles

through

A. P. GREEN *Engineered*

REFRACTORY LININGS



Oil-fired annealing oven for malleable castings. The flat suspended arch is KAST-O-LITE and the sidewalls are G-23 Insulating Firebrick.

Malleable operators report easier controlled annealing cycles through the use of the proper combination of A. P. Green refractories. Efficient furnace operation means lower production costs and better control of the physical properties of the castings. It can only be achieved by a refractory enclosure which contributes to the desired annealing cycle.

A. P. Green KAST-O-LITE insulating refractory castable was used throughout sidewalls and arch for this pulverized coal-fired oven.

The two ovens illustrated are typical examples of A. P. Green engineered refractory linings. One is a complete monolithic lining of A. P. Green KAST-O-LITE, a light weight castable refractory. The other is a combination lining—KAST-O-LITE arch and G-23 Insulating Firebrick sidewalls. Both have excellent performance records effecting improved product quality at reduced fuel costs.

The A. P. Green Fire Brick Company Engineering Department will assist you with further information on the application of these materials to new units or the conversion of existing furnaces. Call your local A. P. Green distributor . . . he's listed in the yellow pages of your telephone directory . . . or write . . .

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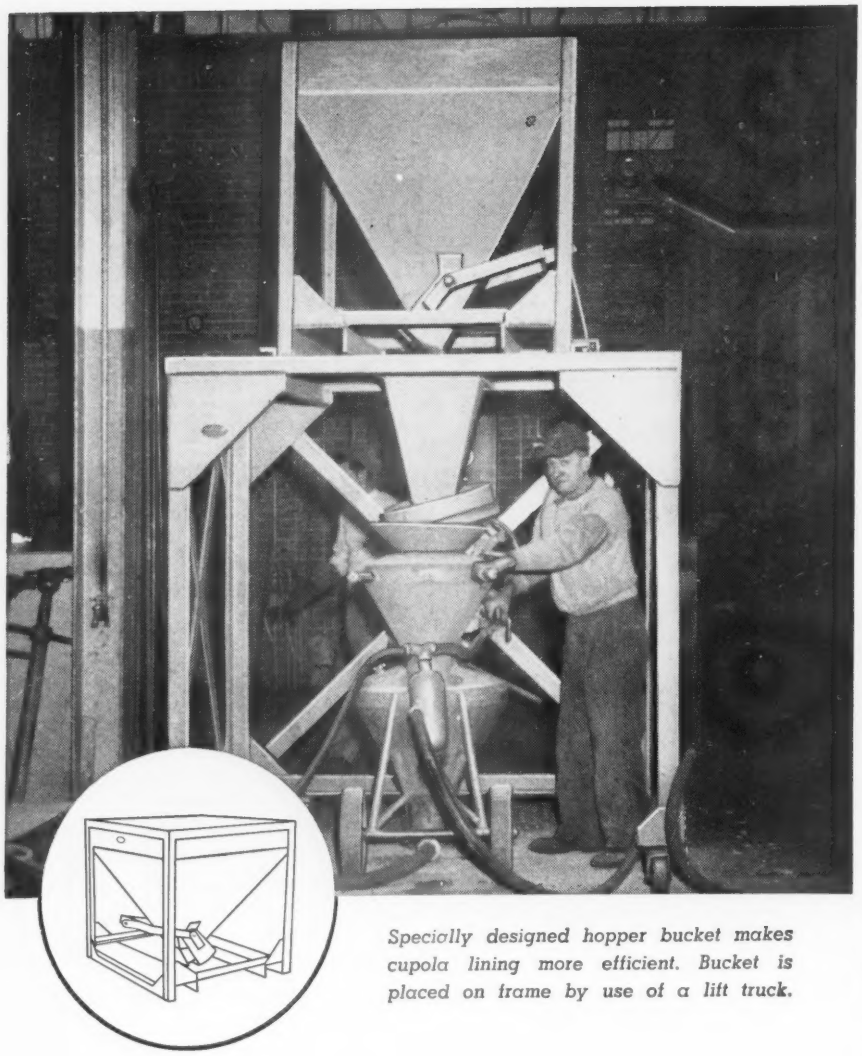


Specially designed hopper bucket makes cupola lining more efficient. Bucket is placed on frame by use of a lift truck.

Solve Your Material Handling Problems With PENN IRON SPECIAL EQUIPMENT

In lining cupolas, Textile Machine Works foundry in Reading, Pennsylvania, had difficulty handling the clay mix used with their Bondactor equipment. After a study of the problem, Penn Iron Works, Inc., designed, engineered and manufactured this special hopper bucket for maximum handling efficiency.

Whatever the bulk-material handling problem in your plant, Penn Iron Works, Inc., will be glad to help with its solution. Our wide experience in designing and manufacturing all types of buckets and special handling equipment for foundries can help you cut costs . . . save time . . . increase efficiency.

For Further Information Write:

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA INC.

PENN IRON WORKS, INC.
READING, PENNSYLVANIA

sizes of inserts for right-hand threads. The inserts permit repair of lefthand threads in these two sizes in such equipment as grinding wheels, machine tools, vehicles, etc. Insertion involves three steps: Drilling out damaged threads, tapping new threads for the insert and installing it.

For More Details Circle No. 35—Page 281

Portable Heater: American Air Filter Co., Louisville 8, Ky.—Low-priced, indirect-fired portable air heater is fired with ordinary fuel oil, but will burn gasoline just as efficiently when outdoor temperatures fall below the "firing range" of fuel

oils. Heating capacity is manually controllable from 50,000 to 170,000 Btu per hour. Heated ventilation air is discharged under pressure by a blower driven by an electric motor. Heater may be used indoors or out, and canvas ducts can be used to spot heat where desired. Like other heaters in the company's line, it has an exhaust stack to permit venting of combustion products to the outdoors.

For More Details Circle No. 36—Page 281

Liquid-Tight Conduit: Universal Metal Hose Co., 2133 South Kedzie Ave., Chicago 23, Ill.—Flexible-metal, electrical wiring conduit is fully enclosed in tough, waterproof, synthetic cover to provide complete protection against moisture, dirt, oil, fumes and chemicals. It is suited for applications requiring flexibility for connections in tight places, for connecting wires on machinery constantly operating in excessive oil or moisture and for applications of extreme vibration, according to the manufacturer.

For More Details Circle No. 37—Page 281

Floor Absorbent: Waverly Petroleum Products Co., 1724 Chestnut St., Philadelphia 3, Pa.—All-purpose grease absorbent reportedly can be used in any plant that has to cope with oil or grease-soaked floors. Manufacturer says the compound will absorb solvents, water, water solutions, resins, waxes, paints, chemicals

AIRengineering at work

REPORT No. 4240.70

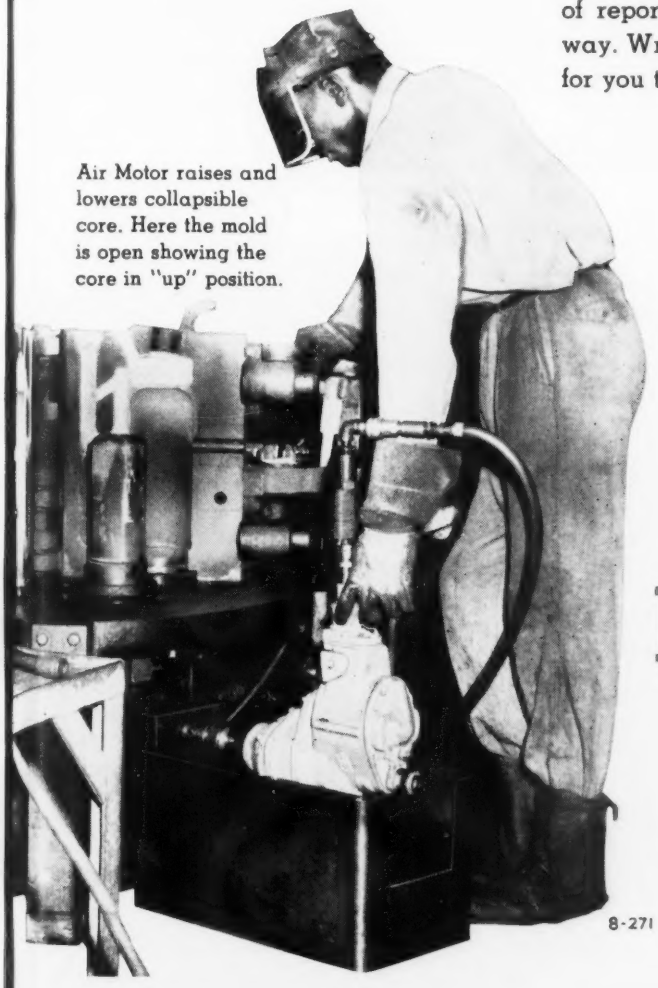
Air Motor Takes "Backache" Out of Molding Job...

SAVES $3.10 *a day..*

A large producer of aluminum parts had a number of strenuous jobs. One involved manually moving a four foot rack and pinion handle through a 200° arc to raise and lower a collapsible core in a book mold.

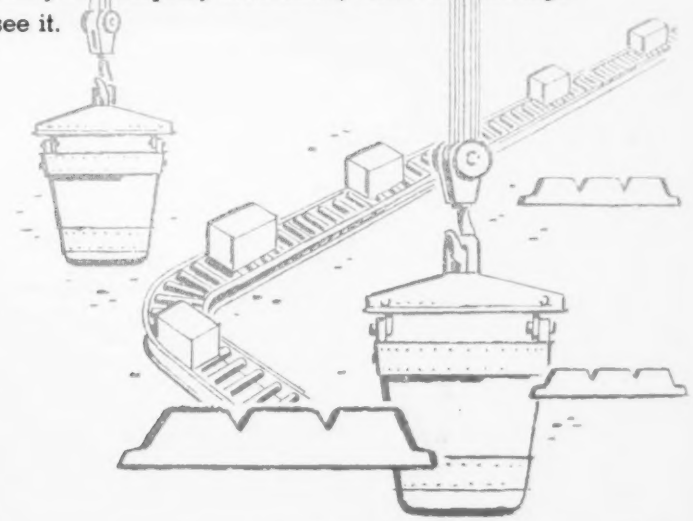
AIRengineering was put to work. An Ingersoll-Rand Size 55SO Air Motor was installed to operate the pinion. Production jumped from 180 to 220 pieces per day . . . workers no longer complained . . . and savings amounted to $3.10 a day. As a result, two more Air Motors were installed, with similar savings.

You may be the man who brings production or maintenance savings into your plant. A look at I-R's *confidential* manual of reports on "AIRengineering at work" could point the way. Write on your company letterhead, and we'll arrange for you to see it.



Air Motor raises and lowers collapsible core. Here the mold is open showing the core in "up" position.

8-271



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AIRengineering Manual

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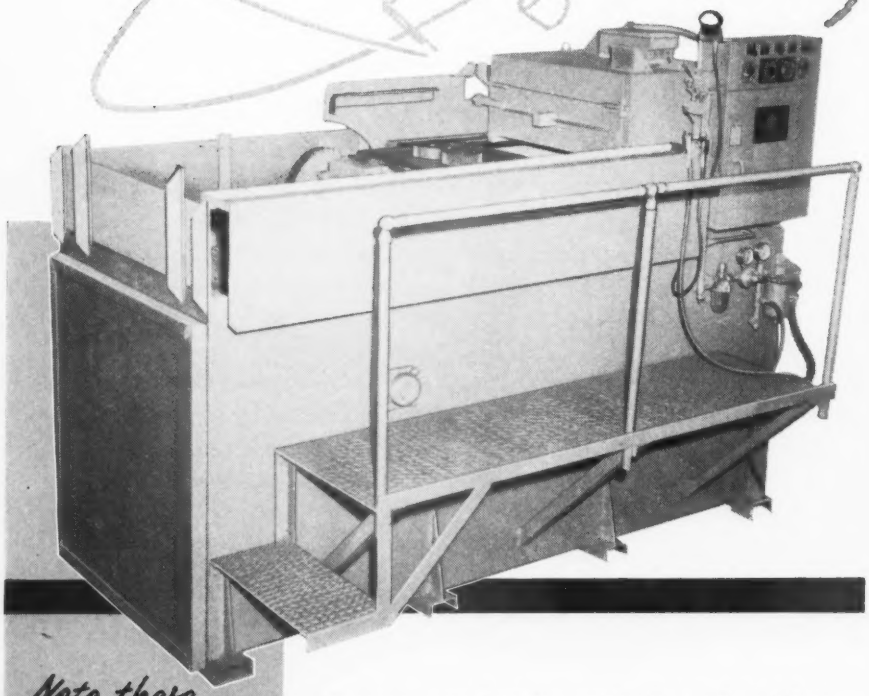
Precision Shell Molds

In less than 70 Seconds

at the push of a button!



Note these Features!

- Infra-red radiant heat curing oven
- Automatic shell ejection system
- Permanent built-in infra-red pattern heating
- Interlocked for safe operation
- Adjustable pneumatic controls
- Cushioned air cylinders
- Machine can be pitted below floor level or used with platform
- 20" x 26" pattern area x 8" depth
- Automatic louvers for vertical drop of sand
- 700 lb. sand capacity

Increase your foundry production, reduce labor costs, sand handling, metal wastage and machining operations, and put precision shell molding on a *push button* production basis —with the *new* . . .

SHELL-O-MATIC
Automatic Shell Molding Machine

A complete cycle from heating of pattern to inspection of finished precision shell takes *less than 70 seconds* with this fully automatic machine. Unskilled personnel can easily handle its most simple operation and yet produce 50 or more completely cured shells per hour! Pattern changeover is a matter of minutes. Quickly installed—one electrical and one air connection and machine is ready for operation.

Write, wire or phone for complete details showing how SHELL-O-MATIC can reduce costs and increase production in *your* foundry.

SHELL-O-MATIC, INC.
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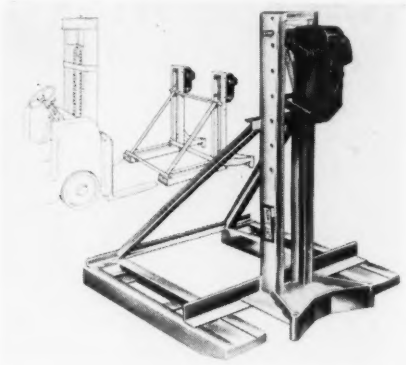
146 Coit St., Irvington, N. J. — Manufacturing

3390

and similar fluids and is equally effective on wood, concrete, brick or steel floors. Material is nonabrasive and fireproof.

For More Details Circle No. 38—Page 281

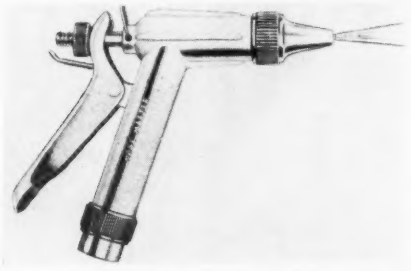
Drum Attachment: Marvel Industries Inc., 2224 Cleveland St., Evanston, Ill.—Fork truck slide-on mounting for use with power truck



attachment eliminates removing forks when handling drums. Fabricated to any size fork dimensions, the mounting can be made to accommodate from one to three units. Units can be spaced permanently for fixed diameter drums, or mounted to be adjustable for drums of various diameters. Mounting is picked up like a pallet, by entering fork into slots.

For More Details Circle No. 39—Page 281

Air Blow Gun: Gilmour Mfg. Co., Somerset, Pa.—Pistol-grip, positive-control mechanism in air blow gun offers continuous scale, wide range flexibility of force, according to the manufacturer. A lock ring at rear of nozzle permits any desired air pressure indefinitely, even while the



grasp is relaxed. Gun is made of non-corrosive, specially alloyed metal with precision tooled, leakproof, all brass valve arrangement.

For More Details Circle No. 40—Page 281

Fog Nozzles: Beta Fog Nozzle Inc., 309 Wells St., Greenfield, Mass. —Fog nozzles for fixed fire protection and other industrial applications employ two spiral turns. These produce an inner and outer cone which results in a uniform coverage over a 90-degree cone. It is claimed that particles in the spray smaller than the orifice will pass freely through the nozzle without clogging. Nozzles

MELTRITE
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More Meltrite is used than any other merchant pig iron. It comes from five plants favorably located to serve the needs of industrial America.

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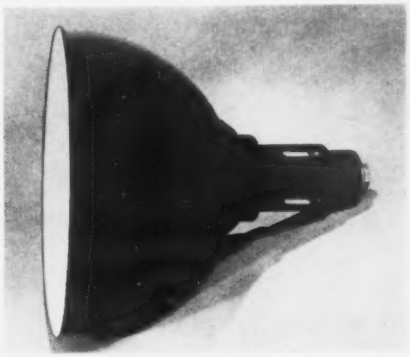
are made with ½-in. male pipe thread in brass or stainless steel. Five models with flow rates from 50 to 50 gpm are available. Over-all length is 2½ in.

For More Details Circle No. 41—Page 281

Synchronous Motors: Specialty Component Motor Dept., General Electric Co., Schenectady 5, N. Y.—New line of synchronous inductor motors features slow-speed synchronous operation and instantaneous acceleration, deceleration and reversing. Units are available in torque ratings of 75- and 2-oz-in. at 60, 50 and 25 cycles. Typical applications include recording devices, control and feed motors, etc.

For More Details Circle No. 42—Page 281

Lamp Reflectors: Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y. — Porcelain-enameled reflectors are for high-bay vapor or incandescent lamp mounting. Lip edges are turned and rolled for stiffening and are finished with



a white interior reflecting surface containing titanium oxide. Slotted necks provide natural air circulation. Lamp fittings and neck sizes accommodate 1000-w incandescent lamps and 400-w high or low pressure mercury vapor lamps. Glass covers, wire guards or moisture shields can be supplied.

For More Details Circle No. 43—Page 281

Self-Flaring Fitting: Flodar Corp., 1366 East 45th St., Cleveland 3, O.—Combination self-flaring fittings for hydraulic pressures in standard sizes for ⅛ to 2 in. OD tubing are said to have these advantages: Makes perfect joint because tubing is internally supported by wedge insert upon which self-flare is made as nut is tightened; saves tubing cost as fitting does not require heavy wall tubing to make good joint; reduces installing time because mechanical flaring is eliminated; affords repeated assembly and disassembly because each time fitting is assembled the nut comes to a positive "rock-bottom" top and guarantees full, unrestricted flow of fluid through tubing at joint because fit-

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Milwaukee Solvay quality begins with the careful selection of the coal which is purchased for one purpose only—to make best coke.

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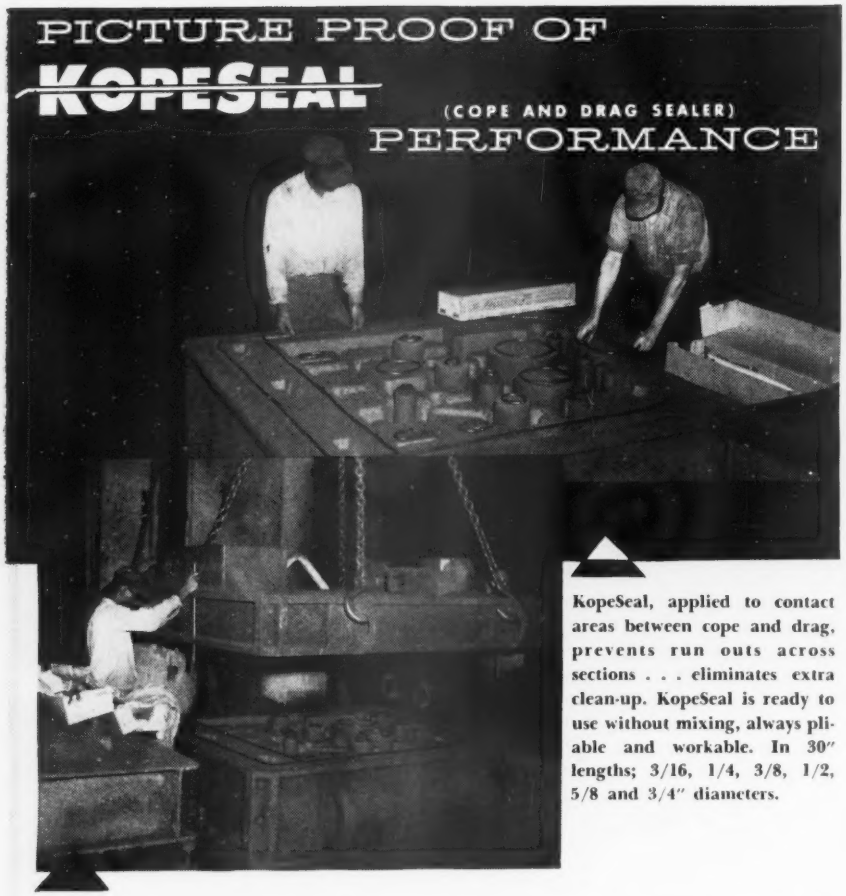
PICTURE PROOF OF
KOPESEAL
(COPE AND DRAG SEALER)
PERFORMANCE



KopeSeal, applied to contact areas between cope and drag, prevents run outs across sections . . . eliminates extra clean-up. KopeSeal is ready to use without mixing, always pliable and workable. In 30" lengths; 3/16, 1/4, 3/8, 1/2, 5/8 and 3/4" diameters.

The cope is positioned on the drag, then removed for inspection of seal. Uniformly compressed bead indicates correct seal; unflattened areas show improper seating, allowing for correction before pouring.

DOES A BETTER JOB THAN MUD OR DOUGH ROLLS ...in *less* time ...at *less* cost!

- QUICK, EASY APPLICATION.
- MORE POSITIVE SEATING.
- PERMITS ACCURATE MEASUREMENT OF METAL THICKNESS.
- SELF-DISSIPATING . . . NO RESIDUE.

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A NEW KOPESEAL
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Toronto, Ont. — *Canadian Hanson & Van Winkle Co., Ltd.*
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Philadelphia, Pa. — *George F. Pettinos, Inc.*
KOPEROPE:
Harrison, N. J. — *Springfield Facing, Inc.*
Milwaukee, Wisc. — *Milwaukee Chaplet & Supply Corp.*

PRESSTITE SEALING COMPOUNDS
PRESSTITE ENGINEERING COMPANY
3766 Chouteau Ave. • St. Louis 10, Mo.

ting can be connected to tubing only when the cut-off end of tubing has full, unrestricted passage, free from collapsed walls or inside burrs.
For More Details Circle No. 44—Page 281

Shaper-Jointer: DeWalt Inc., Lancaster, Pa.—Jointer-shaper fence is an accessory tool for use with company's woodworking machines to convert a radial arm circular saw into a jointer or shaper. Fence replaces the standard wood guide when the machine is to be used for shaping or jointing. With the motor in vertical position, and a shaper or jointer attached to spindle, the material to be processed is fed along the fence through the cutting knives.
For More Details Circle No. 45—Page 281

Air Valve Assembly: Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.—Series of four ¼-in. valves use the same basic assembly when used as a spring return hand valve, spring return foot valve, self-locking bench valve, spring return cam valve or a solenoid-actuated valve. Valve base and body is cast aluminum, seals are neoprene, springs and plungers are brass, bronze or stainless steel.
For More Details Circle No. 46—Page 281

Air Line Filters: Briggs Filtration Co., River Rd., Washington 16, D. C.—Air line filters feature activated fullers earth block and cellulose cartridges to assure positive removal of entrained moisture and oil picked up from compressors in form of atomized particles, as well as dirt, dust particles, rust flakes and other abrasive contaminants. Under normal conditions, filter tank has to be drained once daily.
For More Details Circle No. 47—Page 281

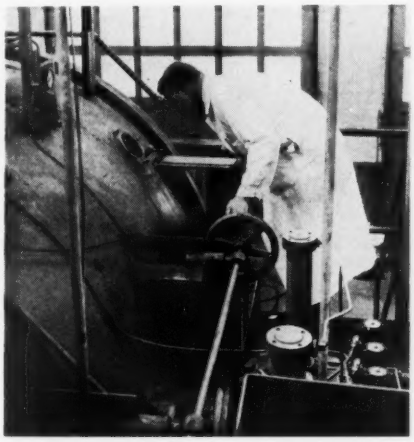
Air Hoists: Keller Tool Division, Gardner-Denver Co., Grand Haven, Mich.—Several air hoist models have been added to company's line to make six different hoists available to meet wide industrial requirements. Newest models have capacities of 500 and 1000 lb while providing lifting rates of 35 fpm. Higher capacity link chain models can handle 1000 or 2000 lb at 19 fpm. A 300-lb capacity unit can lift a full load at 80 fpm while a 150 lb capacity model is for those jobs just too heavy to lift by hand.
For More Details Circle No. 48—Page 281

Roof Insulation: Colonial Refining & Chemical Co., NBC Bldg., Cleveland 14, O.—Liquid insulation material, applied by brush, is said to reduce building temperatures up to 15 degrees. The material serves as an insulator as well as a waterproofing agent on all types of roofs.
For More Details Circle No. 49—Page 281

Vacuum Melting Employed in Developing Improved Metals

Thompson Products Inc., Cleveland, one of the country's largest suppliers of aircraft and automotive components, has turned to vacuum metallurgy for help in developing new high-purity metals that will make tougher, longer-lasting components, and new methods of forming that will improve and simplify its production procedures and lower its costs.

Under the direction of K. M. Bartlett, manager of research, Thompson Products has been actively exploring many potential uses for vacuum-processed metals. At present their activity is directed principally to improvement of high-temperature alloys used for gas turbine engines by use



of vacuum and inert gas atmosphere melting and casting. Future activity will be directed toward development of new alloys whose compositions present difficult or insurmountable problems when attempted with air melting and casting conditions of the conventional type.

Investment casting has been done experimentally under vacuum conditions by Thompson Products' research engineers as part of their evaluation of improved forming methods. This procedure is expected to find considerable application for economical production of jet engine turbine parts, where precise and intricate airfoil contours must be maintained in order to obtain full efficiency from the turbine.

To assist in this research program, Thompson Products recently installed in its Cleveland research laboratory a Stokes model 437 vacuum furnace in which vacuum melted and cast alloys are produced in 200-lb batches. The furnace, 8 ft in diameter and 10 ft long, can be modified to handle 1000-lb melts.

Test specimens of various experimental compositions of metal and alloys are cast in the furnace. These are examined for creep, resistance to

NO SINGLE ABRASIVE can do ALL blast cleaning jobs BEST

It is a fact that your own requirements as to finish and speed determine the type of abrasive you should use. As an example: for heavy cleaning chilled iron shot or grit is indicated; for less severe cleaning or scale removal annealed iron shot or grit may be used. Controlled T "chilled" and Permabrasive "annealed" shot and grit are engineered for the jobs they are to perform. We'll guarantee that our abrasives will produce a savings over your present abrasive costs or we will give you a check to cover the guaranteed savings.* How can you lose? Now is the time to make a test—now is the time to save on your blast cleaning costs.

*10% in the case of Permabrasive
15% in the case of Controlled T

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thermal shock and other characteristics important to Thompson Products. Vacuum-melted metals have shown improved resistance to the destructive effects of high temperatures due to their exceptional purity and homogeneous structure.

The Stokes vacuum furnace features a large-capacity pumping system, using two 10-in. booster pumps and a fore-pump which are capable of handling 60,000 micron cfm at a pressure of 10 microns. This pumping capacity is needed for handling the volume of out-gassing that occurs when melting and degassing high temperature alloys. Controls for the pumping system are grouped on a single panel on which the temperature and pressure indicating gages are also displayed.

AMA Publishes Announcement Of Fall and Spring Seminars

The American Management Association will conduct more than 350 small-group management meetings between September, 1955, and June, 1956. The complete fall schedule of more than 160 seminar groups for discussion of more than 100 different topics has just been published by the association. The spring series will be announced early in 1956.

The association's over-all program of management education, of which the seminars are a part, also includes a dozen regularly scheduled national conferences each year; special conferences, briefing sessions and clinics on specific management problems; continuing courses in management, executive communication and marketing; a research and information service; a supervisory development service; a continuing survey of management compensation; and publications.

Additional information and copies of the new seminar announcement are available from the seminar registrar, AMA, 330 West 42nd St., New York 36.

HOW TO DO IT

Time Saving, Volume Boosting Ideas for the Coreroom

By L. D. PRIDMORE, president, International Molding Machine Co., La Grange Park, Ill.
as told to
ROBERT H. HERRMANN, associate editor

IF DRIERS for small, flat cores are equipped with pins they may be stacked on top of one another to take advantage of the full capacity of the core oven, thus increasing production. View at left shows such driers stacked side by side and on top of one another on a standard coreplate in preparation for loading into the oven.

A quick method of stooling for draw type core blowers is shown at right. One or a number of the flat-topped plates equipped with legs can be used to take up extra space so that coreboxes of different heights can be accommodated by the core blower quickly and easily. This idea is particularly useful when short runs of different cores are performed on one machine.

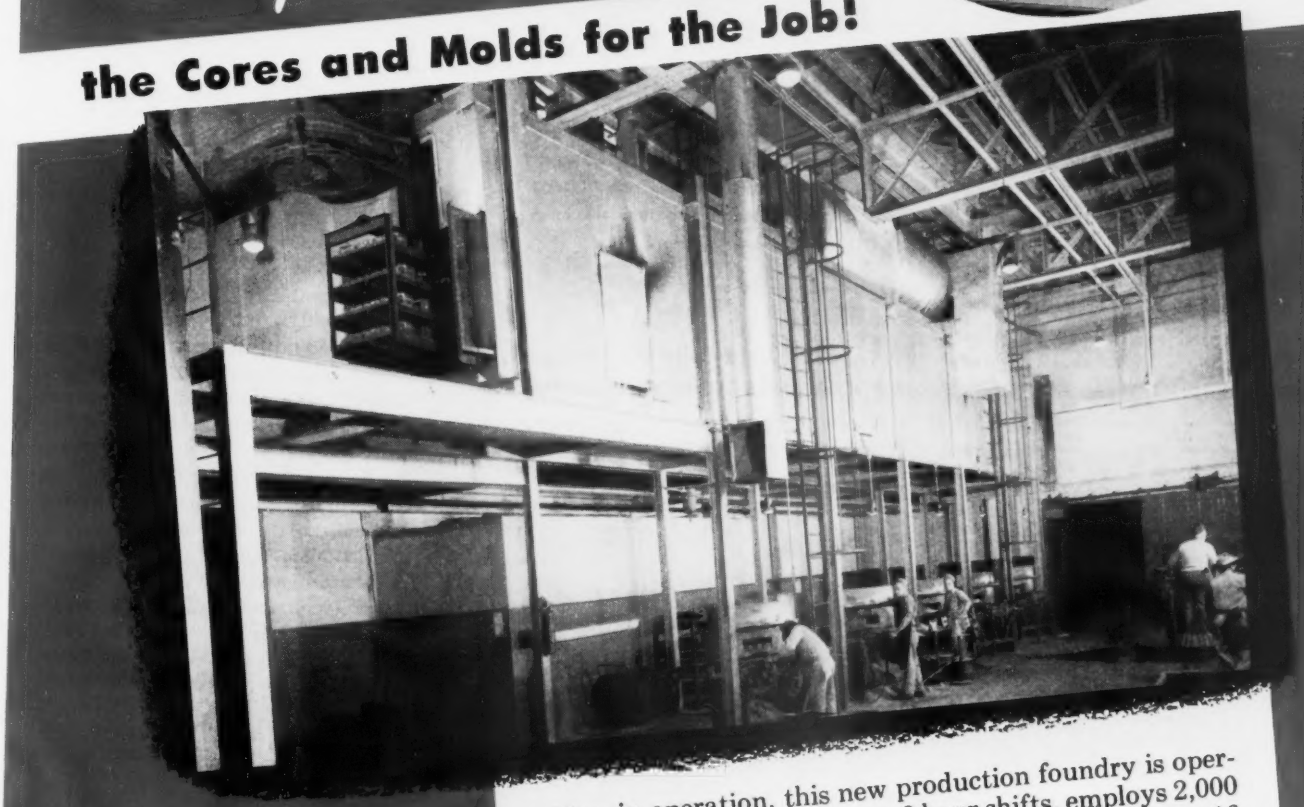
And here is a thought on core pasting. To avoid putting cold cores into an oven for reheating prior to pasting, especially broken cores, use a hot patternmaker's glue for repair or assembly work. It does a good job, and the cores do not have to be put back into the oven to dry the adhesive. Hot glue chills almost immediately and air dries; on the other hand, cold glue is not too satisfactory because it does not set fast enough. Naturally the idea applies to assembling cores as well as to repairing broken ones. Also, when assembling large core halves which ordinarily utilize locking channels filled with lead to hold them together, try pouring hot glue into the locking channels in place of lead. It does the trick.

Do you have any trick of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

Where 1000 Tons of gray iron castings are poured daily

DESPATCH OVENS *Provide*

the Cores and Molds for the Job!



Now in operation, this new production foundry is operating continuously over two 8 hour shifts, employs 2,000 workers and is pouring 1000 tons of gray iron every 16 hours. Cores and molds are baked and dried in Despatch Ovens.

DESPATCH OVEN FEATURES

Increased Production—100% convection heat and up to 75% recirculated air give speedy warm up, fast heat recovery after reloading and fast baking.

Quality Baking—Heavy duty, high volume fans give speedy heat transfer, assure uniform baking.

Approved Control—Despatch ovens are equipped with automatic temperature controls and fire underwriter approved safety systems.

Efficient Operation—Direct gas or oil fired heaters cut fuel costs

. . . for more information about Despatch Foundry Ovens . . .

Write for Bulletin 31, or request a representative call.

DESPATCH OVEN COMPANY

Minneapolis Office
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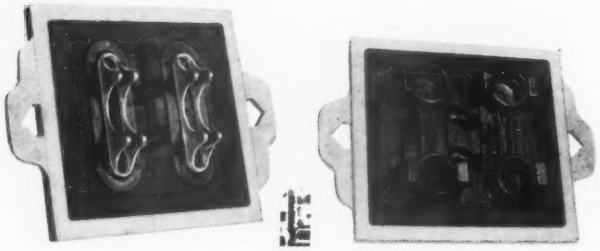
PIONEERS IN ENGINEERING HEAT APPLICATIONS FOR INDUSTRY

PRODUCTION UP 600%

No wonder they call it . . .

SUPER TAMASTONE



● Cope side shows 3" high white metal section set in SUPER TAMASTONE. Due to thin projections 2 ram-up cores must be used.

● Drag side is entirely of SUPER TAMASTONE with 3½" draw cup pattern.

PRODUCTION STEPPED-UP 600% HERE!

With original loose pattern equipment only 35 molds—castings per day were possible. With SUPER TAMASTONE plates shown here 110 molds—220 castings were delivered. All the foundry did was make a duplicate SUPER TAMASTONE pattern. Original and duplicate were then gated together in a 14x16 flask to make match plate. Check photos—see how simple it was.

Super Tamastone will work wonders in your foundry too. Write!

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Responsibility for Safety Starts with Management

Effective Safety Programs Require Unified Effort

By William B. Sobers*

ACCIDENT PREVENTION is more complex than simply having a safety committee or safety director analyze an accident to determine the cause and how to correct it or prevent it from recurring. Now, as never before, it is recognized that safety control is a very important part of foundry business. Management likes it and employees like it. It also gives the employee and his family a stronger feeling of security.

Complete safety equipment and installation of the best safety devices are not enough to combat accidents. Before a foundry can benefit from accident prevention, it must view the problem in all its aspects and have full co-operation from all employees. Glancing through any foundry magazine plainly shows foundries are guilty of unsafe practices.

Responsibility for a safe plant starts with management. It isn't enough to authorize the spending of money for a safety program and to provide safe surroundings and safety equipment. It is up to management to see that interest in safety prevails through the entire plant, down through the supervisory personnel to the employees themselves.

Responsibility for planning accident prevention and safety protection lies squarely on supervision. Men given this responsibility must be able to make employees realize that accident prevention and safety are part of their job and for the employees' own welfare.

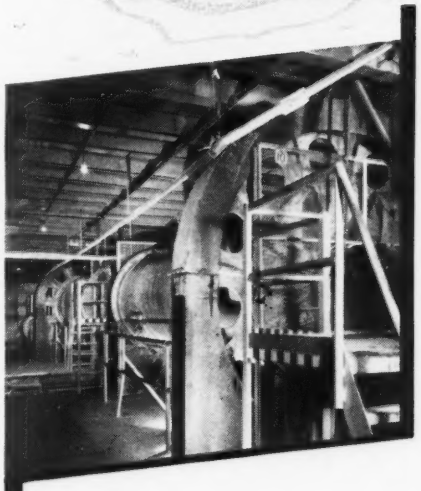
For example, getting the new employee to think in terms of safety plays an important part in accident prevention. At first the new employee is familiarized with plant safety rules and any potential hazards involved for a given job which he may be assigned. This safety training should not end there, but should be continued at his place of work by his supervisor and by department safety meetings, movies, posters, rewards for safety suggestions, etc.

What causes accidents? Most accidents are caused by lack of thinking. As a result, statistics show that most industrial accidents are the fault of the workman; only a small percentage is due to faulty machin-

*This article, which won fourth prize in the 1954 safety letter contest conducted by the Malleable Founders' Society, concludes the series begun in the June issue of FOUNDRY. Mr. Sobers attended the University of Wisconsin and is chief chemist, Chain Belt Co., Milwaukee.

WEDRON

where sand is a science



SAND was once a pretty simple thing. You just dug it up and shipped it to people who needed it. That was O.K. some years ago, but sand like everything else has changed. Nowadays sand must be meticulously clean and uniformity is highly critical. Special grinds are needed for special jobs.

High precision casting is making sand specifications tougher and tougher every year. And Wedron is keeping pace. Many thousands of dollars are spent annually by Wedron for new equipment, new processes, experimentation and testing.

Because of this, you're sure of uniformity, purity and fine rounded grain properties that eliminate cutting out of core boxes. And you get the right sand for *every* casting need; the finest silica flour, fine grades for shell molding or coarser grades for standard casting methods. This high quality and diversified output is a result of Wedron's modern program, bringing science to the art of sand processing.

Why not try Wedron sand on your next order? You'll be well satisfied with its superior quality.

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT

WEDRON SILICA COMPANY

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ery and equipment. Therefore, supervision should feel responsible for insuring that the old or new employee is properly instructed and knows how to do the job he is assigned to safely, be it manual handling of material or a mechanical operation. Workers become careless, assume hazardous positions, err in judgment, lack experience and also are influenced by business economics and availability of labor.

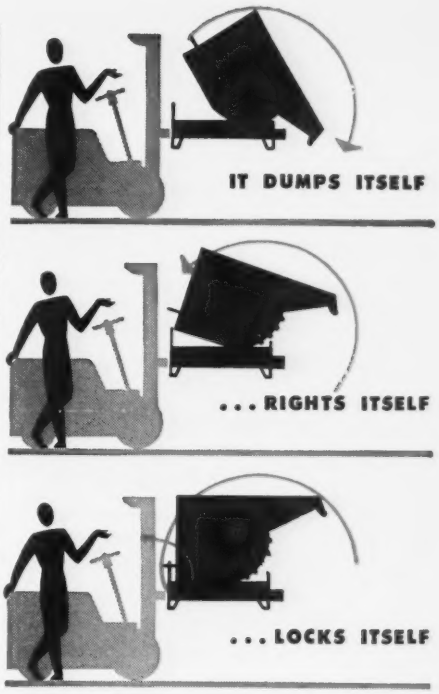
Safety rules and planning are the backbone of accident prevention. They not only tell us what we can do and how to do it, but also what we may not do. Of course, this is all done to eliminate chance taking or breeding of unsafe methods which sooner or later may result in a lost-time accident. Employees should be encouraged to report any unsafe practice or potential hazards which at first normally lead to no-injury accidents and minor accidents and finally to a major accident if the potential is not removed in time. Unsafe guards, improper handling devices and equipment, slipping and tripping hazards are common examples of Accidents Unlimited.

Safety Rules Can Vary

Some safety rules may apply to all foundries. However, because of variations in plant equipment and operations, other safety rules will have to be devised to apply only to the foundry for which they are prepared. On this principle, if the accident frequency is high for a given job, it may become necessary after careful study of the safety factors to establish a safety training program or to change the operations in an attempt to reduce the number of accidents. This procedure may be classified as accident prevention in action.

Good housekeeping throughout the foundry plays an important part not only in accident prevention, but also in fire prevention and is the result of strict adherence to a program of cleanliness with respect to materials and equipment and keeping truck and walk ways free of obstructions. Similar attention should be paid to preventive maintenance, which not only prevents costly breakdowns and work stoppages, but also helps to prevent accidents. Adequate catwalks and ladders for servicing and inspection will help to encourage and control this problem.

Manual handling of material is another important factor. Special care must be exercised in the handling and use of special hazards, such as hot material, inflammable liquids, etc., all of which require consideration as to storage, the route they are hauled, clothing to be worn, mechanical safe-



and lives a long and useful life

Not only do Roura Self-Dumping Hoppers cut handling and unloading costs of wet or dry, hot or cold bulky materials 50% or more . . . they do it year after year with little maintenance or repair. That's because Roura Self-Dumping Hoppers are engineered to take "hard knocks" . . . extra heavy gauge metal . . . sturdy arc-welded joints . . . perfect balance for smooth and rhythmic operation.

The rugged Roura gives you simple one-man semi-automatic operation. Models to fit any standard fork or platform lift truck. Also available mounted on live skids, or with malleable or rubber tired wheels or casters. Sizes range from ½ to 2 cubic yards.

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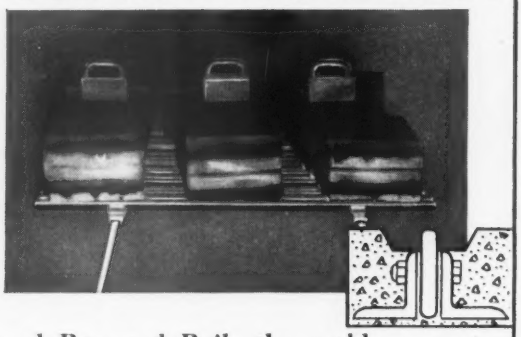
NEW RECESSED RAIL

means

- MORE PRODUCTIVITY
- GREATER EFFICIENCY
- BIG SAVINGS



When you use Nomad Recessed Rails the molds are set on a pallet, sent down the conveyor line and poured. This modern procedure marks the tremendous improvement between the old "running out" and the new "rolling away" of molds. The work area is kept clear. There is added time for increased production. And, shake-out and sand preparation can be handled with existing equipment. The whole Nomad process is *easier*. That's all there is to it!

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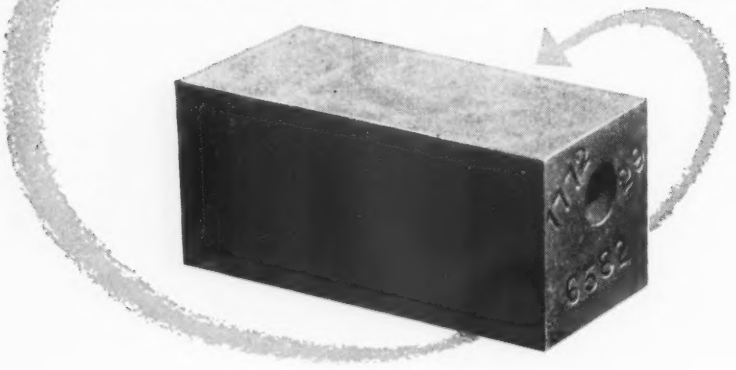
FOR SLAG HOLE FAILURES



Durable CARBOFRAX® silicon carbide blocks give 20 or more hours uninterrupted service in continuous pour cupolas . . . with practically no change in hole size. But why take our word for it? Order a few and see for yourself. Single standard size block costs only $4.70. Other sizes can be made from stock molds. Address Dept. AA95, Refractories Division, The Carborundum Company, Perth Amboy, New Jersey.

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ty devices and special instructions.

Plant fire protection is also closely associated with accident prevention and should not be overlooked or its over-all value underestimated.

In our company, another important factor has been the foundry job placement program, fitting the worker's physical capabilities to the job's physical requirements so as not to jeopardize his or his fellow workers' safety.

Regular employees receive physical examinations at least annually. As a result, it may be necessary to transfer an employee to another department to reduce the possibility of accidents.

Some principal health hazards to guard against in the foundry are exposure to gases, dust, excessive heat and noise.

Management of our company has been sincere in its support of safety. Our company's standard practice manual states, "*Nothing else shall take precedence and whenever our safety objective shall be in conflict with other objectives, safety will be our first consideration.*" This effort has resulted in the presentation of safety awards to our foundry divisions and fabricating plants by the National Safety Council and the Wisconsin Council of Safety.

In the final analysis, we can see readily that many factors enter into Accident Prevention—mainly, people, material, and machinery. It is the individual who can do the most to keep the cost of accidents to a minimum, providing that he is *safety educated*. However, no one man or group of men can conquer this problem alone; it requires the combined effort of all employees. As a result, the foundry will not only become a safer place to work, but a better place to work; hence better human relationships will attract a higher level of skilled help and result in a better cast product. Look over your safety control program now in preparation for a better try in '55!

ASM Elects New Officers

National officers of the American Society for Metals for 1955-56 will take office during the 37th National Metal Congress and Exhibition in Philadelphia, Oct. 17-21. They are A. O. Schaefer, vice president of engineering and manufacturing, Midvale Co., Philadelphia, president; D. S. Clark, professor of mechanical engineering, California Institute of Technology, Pasadena, Calif., vice president; C. H. Lorig, technical director, Battelle Memorial Institute, Columbus, O., treasurer; and W. H. Eisenman, ASM National Headquarters, Cleveland, secretary.

in nonferrous foundries SURFACE INDICATIONS CAN BE MISLEADING

To accurately measure temperature of molten, nonferrous metals, readings should be made *below* the surface.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip—it takes temperatures below the surface, where accuracy is unaffected by dross and other surface conditions. Enclosed couple is protected against flame, fumes, and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Investment Casting Group Works on Three Projects

Study Tolerances, Test Bars and Nonmetallics

A DRAFTING AND DESIGN manual to analyze the factors affecting tolerances in investment casting is one of the major projects now under way by the Investment Casting Institute, Chicago.

A questionnaire covering all types of design will be used to solicit the information for the manual from manufacturers of investment castings as to tolerances that reasonably can be expected in each type of design. The dimensional tolerances committee of the institute, under the chairmanship of E. G. Chapman, Misco Precision Castings Co., will analyze the results.

Studies will be conducted by the following: Hole tolerances, Joseph Levine, Investment Casting Co.; airfoil tolerances, Joseph Stannard, Pratt & Whitney Aircraft; industrial component tolerances, W. C. Jenkins, Casting Engineers Inc.; positional tolerances, H. T. Clinton, Wright Aeronautical; and linear tolerances, R. C. Kramer, Thompson Products Inc.

A study of surface finishes also will be included in the completed manual.

Another important project of the institute is the establishment of classifications and specifications for all materials other than metals used in the industry. These activities will be the work of the group's process materials standard committee, headed by Walter A. Dubovick, Engineered Precision Castings Co. Tests will be developed to determine the optimum properties of materials so

"Wait'll he discovers I substituted my kid's kaleidoscope."

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CHILLED CAST IRON SHOT & GRIT

For tough cleaning jobs or surface finishing of heat-treated parts.

HI-ALLOY "B" CAST IRON SHOT & GRIT

Hi-strength reduces fracturing due to impact.

MALLEABLE SHOT & GRIT

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STEEL SHOT (Hardened and Drawn Cast Steel)

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CUT STEEL WIRE SHOT (Hard Drawn Cut Steel Wire)

Extensively used in peening springs and other metal parts.

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ABRASIVE SHOT & GRIT CO., INC.

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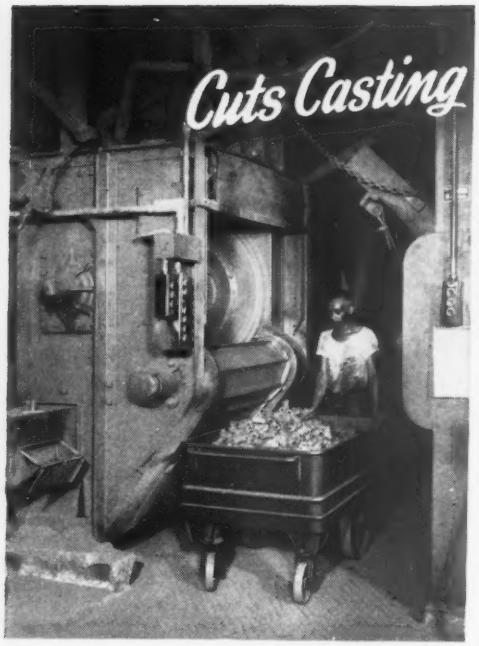

Illustration shows one of 25 Sterling Heavy Duty Trucks in daily use at the Green Foundry, St. Louis, Mo.

Cuts Casting Handling Costs!

Sterling Heavy Duty All-Steel Trucks are ideal for transporting castings from Wheelabrator, Roto Blast or similar equipment. 2000 lbs. capacity. Reduces number of loads required. Saves both time and labor. Height is adjustable to accommodate discharge door. Roller bearing wheels and ball bearing swivel casters increase maneuverability. Sturdy, reinforced welded construction.

Investigate how these heavy duty Sterling Trucks can cut your casting handling costs. Write today.

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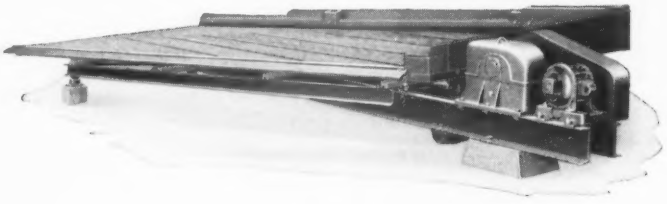

Foundry Metallics Reclaimed at Handsome Profits

Recovery of non-ferrous metallics from foundry and machine shop residues is both economical and highly profitable with the SuperDuty® DIAGONAL-DECK Table.

This efficient device separates fine size materials of different specific gravity by washing the feed over moving riffles. Recovery of the metallic values is so positive that many are finding it very profitable to process old waste piles as well as floor sweepings and other residues.

For full information, write for Bulletin 118-B.

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935 Glasgow Ave. • Fort Wayne, Ind., U. S. A.

that supplier and purchaser can control quality and guarantee conformance of materials with the optimum properties.

Three subcommittees have been established, dealing with expendable pattern materials, proprietary investments and investment raw materials. The first will devote its attention to wax, plastics and low-melting point metals. It will consider such factors as volumetric change, penetration, melting points, ash content, viscosity, color, toxicity, contaminants and packaging. The second will work with ferrous and nonferrous groups in determining thermal curves, consistency, compression strength, setting temperatures and contaminants. The third will study binders of phosphates and ethyl silicates, screen analysis of refractories, pyrometric cone equivalents, calcination, chemical analysis, packing characteristics and packaging.

Members of these committees are C. W. Schwartz, Misco Precision Casting Co.; Paul Solomon, Yates Dental Mfg. Co.; A. Aufhauser, Industrial Raw Materials Corp.; Harold G. Deters, Anderson Laboratories Inc.; John J. Jesmont, Crucible Steel Co. of America; Y. Pessel, Centrifugal Casting Co.; Ray Reuter, National Aluminate Corp.; H. Lee Scott, Scott Casting Mfg. Co.; C. H. Watts, Pre-vest Inc.; T. E. Moore, Ransom & Randolph; and Karl K. Breit, A. P. Green Fire Brick Co.

A proposal for a test bar for superalloys has been submitted by the physical and nondestructive testing committee for approval by the institute. Committee Chairman B. W. Duncan, Alloy Precision Casting Co., reported that work on developing recommended test bars for the industry should be completed soon and final results presented to the November ICI meeting in Detroit.

Test bars developed by the committee and approved by the institute membership will be submitted for approval and adoption as ASTM standards. Working with Mr. Duncan on the project are James Bly, X-Ray Inc.; T. E. Millard, Thompson Products Inc.; George Poole, Pratt & Whitney Aircraft; and R. J. Wilcox, Michigan Steel Casting Co.

Instrument Maintenance Clinic To Be Held in Los Angeles

The 1955 Maintenance Clinic of the Instrument Society of America will be presented in Los Angeles Sept. 10-12. It will be held in Founders

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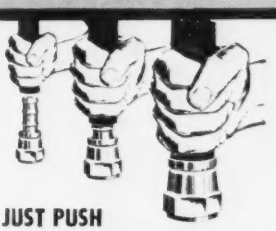
DURABLE ALL-STEEL BOX



JUST PUSH Aeroquip 1525 Hose on the SOCKETLESS Fitting . . . It Stays On Even at Pressures as High as 250 p.s.i.

PATENT APPLIED FOR

Back of fitting tray can be raised for convenient use

Kit 5144 contains 93 fittings and adapters in 20 sizes and types

Compartment of Kit 5144 contains 24 ft. of ¼" hose, and 24 ft. of ⅜" hose

Pull out hose, measure it, and cut with knife

Many users have requested a permanent-type container for Aeroquip *SOCKETLESS* fittings and hose. So this durable all-steel Kit 5144 is now available. It contains an inventory of hose, fittings, and adapters in types and sizes that will meet practically all low pressure applications.

With remarkable new Aeroquip *SOCKETLESS* fittings and hose, fuel, oil, water, and air lines can be made and installed *extra fast* on all kinds of industrial and mobile equipment. Field replacement is simplified because Kit 5144 is compact (12½" x 12½" x 6½" when closed) and it will stand up in field service.

Aeroquip *SOCKETLESS* fittings and hose are saving time and money for users in every industry. Get the complete story from your Aeroquip distributor, listed in your Yellow Page Directory, or write us.

Also Available: 15-Cell Kit No. 5143 with 24 feet of ¼" hose and 71 fittings and adapters in same box.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

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automatically controls moisture in your prepared molding sand.

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assures the molder a constant sand supply in the hopper.

Available separately or as a group, they are used in foundries everywhere. Let us tell you more about them. Write today to:

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The original manufacturer of automatic controls for sand systems.

Hall, University of Southern California, beginning 7:30 p.m. Sept. 9, continuing through Saturday and Sunday, Sept. 10 and 11, and ending at 12:30 p.m., Monday, Sept. 12.

Registration fee is $5 for members of organizations participating in the ISA conference and $7.50 for others. At the closing sessions, certificates will be presented to all persons who complete their schedules. To enroll, send the registration fee to ISA Instrument Maintenance Clinic, 1315 Allegheny Ave., Pittsburgh 33, Pa.

Johnson-March Co. Appoints Eleven Representatives

Eleven new manufacturers' agents have been appointed by Johnson-March Corp., Philadelphia, to distribute the company's dust control equipment in foundries and other metals plants. All are engineering firms and will operate under the supervision of Johnson-March district managers and staff engineers. Appointments are as follows:

Acme Engineering Agency, Indianapolis, in Indiana except the Chicago-South Bend area; J. J. Ballenger, Cincinnati, southwestern Ohio and central Kentucky; Dorner Co., Milwaukee, southern Wisconsin; Victor H. Jones Co., Chicago, northwestern Indiana and northeastern Illinois; Linder, Cox & Co., Lakeland, Fla., Florida; and Ralph E. Little, Davenport, Iowa, northwestern Illinois and eastern Iowa.

Others include Power Specialty Co., Nashville, Tenn., southern Kentucky and Tennessee east of the Tennessee River; Rhodes Equipment Co., St. Louis, eastern Missouri, southern Illinois, western Kentucky and southwestern Indiana; Stanley B. Troyer Equipment Co., Crosby, Minn., Minnesota, North Dakota, South Dakota, northern Wisconsin and the upper peninsula of Michigan; United Equipment Co., Columbus, O., central Ohio; and Western Ohio Ventilating Co., Toledo, O.

Offers Home Study Course In Industrial Engineering

To meet the increasing need of industry for continued safety programs and practices, a new home study course in industrial safety engineering has been added to the curriculum of International Correspondence Schools, Scranton, Pa.

The course is designed to help industrial supervisors in charge of safety, industrial engineers who desire safety training, safety representatives of labor departments and

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REMA is the New and Amazing Self-Vulcanizing Rubber Repair Material

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• REMA is not just another cold patch. REMA is vulcanization by chemical process. The repaired area is sealed with an abrasive resistant cover stock patch. No heat or heavy vulcanizing equipment required. Here's the astonishing advantage—*when repair work is completed belts may be returned to service immediately.*

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RUBBER REPAIR MATERIALS

persons whose responsibilities call for a knowledge of safety practices in industry.

It is comprised of 41 lessons which require an estimated average study time of 650 hr and provide instruction in mathematics, machine sketching, blueprint reading, industrial phychology, handling of materials, plant and production equipment layout and safety principles and practices. Employers may select only those instructional units which meet an immediate and specific need.

Investment Casting Institute Receives Association Award

Investment Casting Institute recently received one of the awards made annually by the American Trade Association Executives for distinguished service.

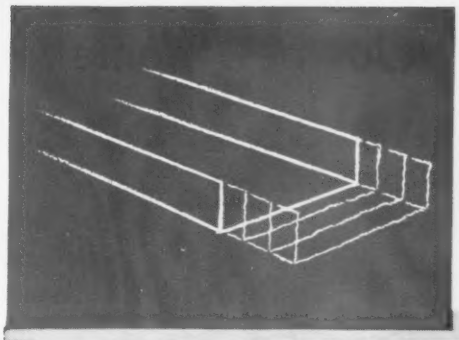
In the 26-year history of this national award, no other trade association has won the competition so soon after its formation. The Investment Casting Institute was organized in December, 1953. It was announced as the winner of the nation and regional association group with an annual budget of less than $50,000.

Criteria for judging in the annual contest are distinguished service to industry, to industrial development, and to the public as a whole or some important segment of the public. The citation read in part:

"In its first year of existence, the Institute completed a comprehensive survey of the size, capacity, markets and weak spots of its industry. It has, through its specific educational and promotional programs, conveyed to designers and engineers of both government and industry, the beneficial attributes of the investment casting process for production of precision metal parts. Through the work of its technical committees, the Institute completed preliminary steps in the development of industry standards for metal specifications, dimensional tolerances, testing procedures and process materials. Through these many programs and activities, ICI has helped a new and vital industry in its efforts to reach its full potential."

U. S. Commerce Secretary Sinclair Weeks headed the awards selecting jury, which also included representatives from industry and universities.

Officers of the Investment Casting Institute are: President, Ted Operhall, president, Misco Precision Casting Co.; vice president, Vincent S. Lazzara, Casting Engineers Inc.; executive secretary, Harry P. Dolan.



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Volume Production of SMALL PARTS

Controlled atmospheres—heating—fuel economies—stock handling. All these are factors to consider when you are trying to determine which heat treat furnace to select.

Take stock handling, for example. You might well consider a shaker hearth furnace if you are a volume producer of small parts such as screw machine production or stampings. It's continuous—a type of stock handling that's geared to production flow—and a type that eliminates the possibility of a bottleneck in the heat treat department.

The work is either manually or automatically placed directly on a hearth which is designed to move forward quickly a few inches, stop suddenly, and then return to its original position. The sudden jolt slides the parts through the furnace. An alternate arrangement is set up so that the hearth moves forward slowly, halts, then snaps back to its original position. Either method assures uniform heat treatment of each individual part.

You can get engineering information—honest appraisals of your problem—if you consult Holcroft when you are planning expansion. The result is bound to be a heat treat facility *balanced* to your production requirements. It will cost you less in the long run! Write today for complete information!

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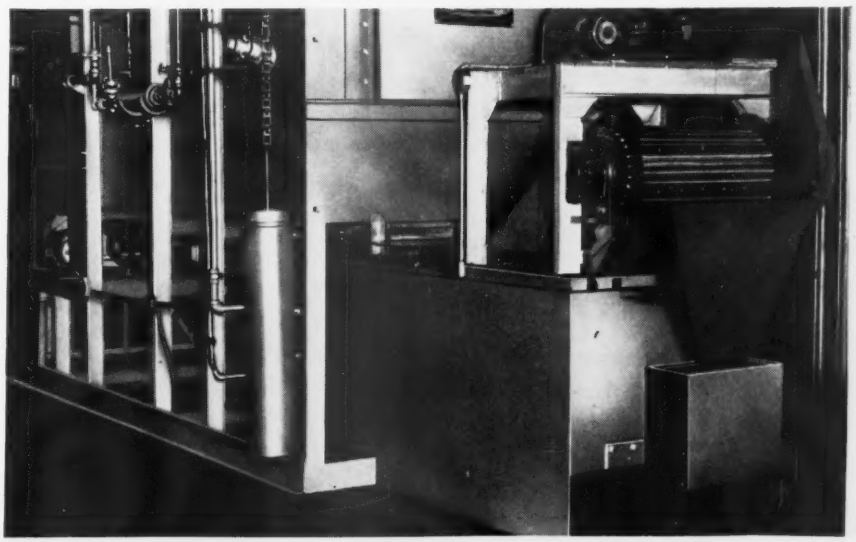
CANADA: Walker Metal Products, Ltd., Windsor, Ontario



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HYDRO-BLAST now offers you *better service and engineering* . . . with new facilities to meet the constantly expanding needs of our industry. Our engineering force and pilot plants are always available to help you with your problems.

We wish again to express our appreciation to foundrymen for making this "expansion of facilities" necessary.

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Pioneers in Foundry Sand Reclamation Systems

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Chicago, Milwaukee Gray Iron Founders in Joint Meeting

Some 50 members of the Chicago and Milwaukee Management Groups of the Gray Iron Founders' Society convened in a joint meeting in Waukegan, Ill., June 28, with the former group as host. It was the first such meeting of the two groups, but expectation is it will become an annual event.

Special guests were C. H. Ker, president, Dalton Foundries Inc., Warsaw, Ind., national president of the Gray Iron Founders' Society, and Donald H. Workman, executive vice president of the society. Both spoke, reviewing current activities of the organization and the gray iron castings industry.

Sharing honors in presiding at the get-together were John M. Gajentan, vice president, Chicago Foundry Co., Chicago, and I. O. Heatwole, vice president, J. E. Gilson Foundry Co., Port Washington, Wis., who are chairmen, respectively of the Chicago and Milwaukee groups.

The meeting provided an opportunity for informal discussion of problems confronting producers of gray iron castings. Among these were business prospects, quality of product, materials supply and labor relations.

New ASA Standard Describes Sound, Vibration Analysis

Tracking down noise and vibrations and reducing them at the source may eliminate hearing loss and dangerous mechanical failure caused by vibrations. The American Standards Association has just published an "American Standard Method for Specifying the Characteristics of Analyzers Used for the Analysis of Sounds and Vibrations," Z24.15-1955, to aid detection of noise and vibration.

This standard has been prepared to help users and manufacturers of analyzers not restricted to octave bands since a much finer analysis is desirable for detecting some noises and reducing them at the starting point. For example, an octave band would give sufficient analysis of room noise, but to quiet a machine with many gears, an analyzer must be sufficiently selective to separate individual components of the noise.

The national committee which developed the standard according to procedures of the ASA is sponsored by the Acoustical Society of America. Copies of the standard may be obtained from the ASA, 70 East 45th St., New York 17, for 50 cents per copy.

TRADE . . Publications

For More Details Use Reply Card—Page 281

LEAKPROOF CASTINGS: Geo. Sall Metals Co., 2308 East Butler St., Philadelphia 37, Pa.—Booklet, "How to Produce Leakproof Aluminum Castings," cites various recommendations for minimizing porosity in aluminum castings and suggests operational methods by which foundrymen can produce castings of intricate design and high quality to meet rigid specifications.
For More Details Circle No. 141—Page 281

GAGE BLOCK ACCESSORIES: Ellstrom Standards Division, Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.—Brochure describes and illustrates company's line of square and rectangular gage block accessories designed to permit direct application of gage block accuracy to wide range of precision production and inspection measuring operations.
For More Details Circle No. 142—Page 281

TEMPERATURE CONTROL: Burling Instrument Co., 16 River Rd., Chatham, N. J.—Bulletin 151 offers specifications and engineering data on two pneumatic temperature controls for use on installations where temperature is to be controlled by varying the flow of gas, steam or other medium with an air-operated valve or motor.
For More Details Circle No. 143—Page 281

FOUNDRY CLEANLINESS: Frederic B. Stevens Inc., Detroit 16, Mich. —Technical bulletin FP-126, "Quick Steps Toward Foundry Cleanliness," describes how recently developed products can hold foundry dust to a minimum and also details other products that can make working conditions cleaner and more healthful.
For More Details Circle No. 144—Page 281

TRUCK ATTACHMENT: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.—Truck engineering bulletin contains application, design and operational information on an hydraulically operated attachment designed for automatic dumping of skid boxes or racks and used with its low-lift platform trucks.
For More Details Circle No. 145—Page 281

STORAGE EQUIPMENT: Frick-Gallagher Mfg. Co., 110 South Michigan Ave., Wellston, O.—Racks, bins, shelves, pallet frames and other storage equipment are presented in illustrated color catalog. Product and in-use photographs, general description and specifications are provided.
For More Details Circle No. 146—Page 281

NITROMETER MASKS: Industrial Products Co., 2827 North Fourth St., Philadelphia 33, Pa.—Light-weight face masks primarily designed to protect eyes and face from sprays of

HYDRO-BLAST
Sand Reclamation Units

are serving these outstanding foundries:

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Renton, Wash.

Symington-Gould Corp.
Depew, N. Y.

Union Steel Castings Co.
Pittsburgh, Pa.

United Engineering & Foundry Co.
New Castle, Pa.

U.S. Naval Shipyard
Pearl Harbor, H. I.

U.S. Naval Gun Factory
Washington, D. C.

Wehr Steel Co.
Milwaukee, Wis.

West Michigan Steel Foundry Co.
Muskegon, Mich.

'A Wet Method of Sand Reclamation'

16-page reprint of a paper on the subject presented at the 1953 AFS Convention in Chicago—as well as a paper entitled "Sand Reclamation in a Steel Foundry." We'll be happy to send reprints of these papers to you.

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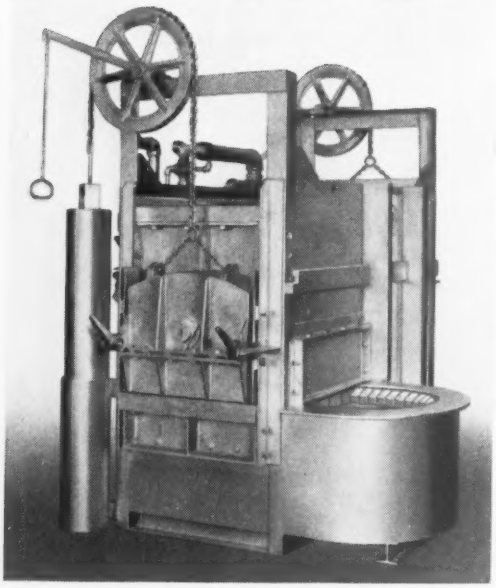
NEW JOHNSTON REVERBERATORY FURNACES!



★ Available in from 400 to 2,000 pound per hour capacities.

★ All parts exposed to flame or direct radiation are cast iron.

★ Automatic controls in breakdown and holding chambers.

★ Equipped with Johnston nozzle mixing burners.

★ Lined with top quality refractory brick.

★ Advanced design and quality workmanship throughout.

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machined all over and engineered to fit the needs of your foundry

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Anderson Pattern Inc.
MUSKEGON MICHIGAN

acid, fragments of glass and foreign materials have been found practical for other industrial operations as grinding, buffing, polishing, spot welding, wire brushing and cleaning, metal band sawing and woodworking. Masks are described in bulletin A33-15.

For More Details Circle No. 147—Page 281

WATER FILTRATION: Johns-Manville, 22 East 40th St., New York 16, N. Y.—Illustrated brochure, "Get Perfect Water Clarity with Celite Filtration," covers filtration of potable water, process water and plant wastes. Brochure explains how diatomite filter helps remove colloids and other suspended impurities, shows the adaptability of powders to various types of filter designs, and cites representative installations where the filter is being used.

For More Details Circle No. 148—Page 281

REPRODUCTION MATERIALS: Graphic Reproduction Division, Eastman Kodak Co., Rochester 4, N. Y.—Materials available for the preparation and reproduction of drawings and documents are described in detail in booklet, "Kodagraph Reproduction Materials." Two-page materials selection chart is designed to help in selecting film and paper best suited to any job.

For More Details Circle No. 149—Page 281

SHELL CORES: Shallway Corp., Connellsville, Pa.—Bulletin on shell cores describes how to produce shell cores for experimental purposes without special equipment and offers technical advice on blowing shell cores with shell core blowing equipment. Bulletin also covers design of corebboxes, blowing temperatures, sand-resin mixes, blow pressures, wall thickness, core removal techniques and shell core costs.

For More Details Circle No. 150—Page 281

INVESTMENT CASTING: Surface Combustion Corp., Toledo 1, O.—Bulletin SC-170, "Gas-Fired Furnaces for Investment Casting," tells how gas-fired furnaces provide uniform mold heating, accurate time-temperature cycles and simple burner control. A typical five-zone continuous furnace is diagrammed.

For More Details Circle No. 151—Page 281

FILLET MACHINE: Glover Mfg. Co., 735 Mohican Pl., Meadville, Pa.—Bulletin contains application information and photographs showing corebox and fillet machine performing a variety of intricate cuts. Safety features, setup and operational data, specifications and accessories also are covered.

For More Details Circle No. 152—Page 281

PICKLING: International Nickel Co., 67 Wall St., New York 5, N. Y.—Booklet, "Equipping the Pickle House," is a practical guide to greater production in a wide variety of pickling operations. Booklet illustrates applications of monel in sling chains, yokes, special hooks, crates, racks, baskets, drums and other batch han-

Dear Reader:

Our Editors have been having a busy summer -- it's a real pleasure to call your attention to several editorial reports which FOUNDRY will bring you this fall.

In this issue, for instance, there appears the full story on CHEVROLET'S NEW GRAY IRON PRODUCTION FOUNDRY AT TONAWANDA. You "can't miss" this outstanding report and light metal foundrymen will be rewarded for reading AUTOMATIC CASTING OF ALUMINUM EMPLOYS CONTINUOUS MELTING. Check Contents (page 3) for exact location.

Are you a "brass foundryman?"

The new series by Harry St. John (foundry superintendent, Crane Co., Chicago, for many years until his retirement recently) will very likely be the most significant nonferrous articles published for many years! No. 2 article, "Selecting Ingot and Scrap in the Brass Foundry," is in this issue -- next month, he will discuss, "MELTING FURNACES IN THE BRASS FOUNDRY."

Shell molding!

Everyone's interested in this important new process which is the reason why Associate Editor Bob Herrmann's report on LYNCHBURG FOUNDRY'S NEW SHELL MOLD FOUNDRY appears next month!

In November, we will feature another joint report of our Editors and Market Research Staff -- INVENTORY OF FOUNDRY MATERIALS HANDLING EQUIPMENT. A companion report to last year's foundry equipment inventory, this report will be of interest to foundrymen with material handling problems: most of us, in other words.

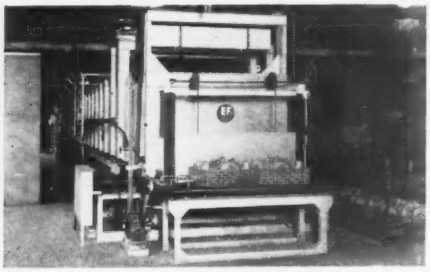
As always, each monthly issue brings you the LATE NEWS INSERT (page 32) and from 95 to 105 pages of news and information gathered exclusively for foundrymen! Feature stories scheduled for later appearance include, "Use of ZIRCON SANDS in Making Large Castings;" "Castability of ALUMINUM ALLOYS:" "Impurities in COPPER-BASE ALLOYS."

It is a pleasure to serve you!

FOUNDRY

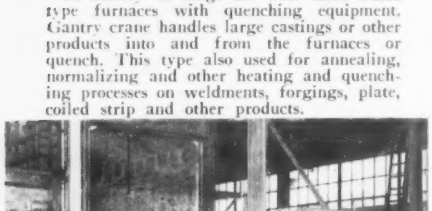
EF FURNACES

Electric or Fuel Fired
Continuous or Batch Types
We build the furnace to fit the job



Charging end of an EF continuous special atmosphere furnace handling short cycle malleable castings. Shows 2 baskets of castings ready for pushing thru furnace in 2 parallel rows. The castings are uniformly treated in a special atmosphere produced by an EF generator—no packing material is needed.

A battery of large EF fuel fired batch type furnaces with quenching equipment. Gantry crane handles large castings or other products into and from the furnaces or quench. This type also used for annealing, normalizing and other heating and quenching processes on weldments, forgings, plate, coiled strip and other products.



Large EF gas fired bulkhead, car bottom type furnaces with motorized car and door operating equipment and automatically controlled heating zones are used for uniformly annealing large castings, stress relieving weldments and other processes.

Foundry Bulletin No. 461
shows typical installations of EF Gas-fired, Oil-fired and Electric Furnaces
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dling accessories and in hold-down rolls, lifting arms, pinch rolls, tank guides and other parts exposed to corrosive conditions in continuous pickling lines.
For More Details Circle No. 153—Page 281

HYDRAULIC STANDARDS: Miller Fluid Power Co., 2040 North Hawthorne Ave., Melrose Park, Ill.—Revised J.I.C. hydraulic standards for industrial equipment is compiled in 20-page illustrated pamphlet. Also included are recommended practices on hydraulic packings and seals, examples of packing code identification, sample circuit using J.I.C. symbols, glossary of terms and other information.
For More Details Circle No. 154—Page 281

BLAST CLEANING: Wheelabrator Corp., 1102 South Byrkit St., Mishawaka, Ind.—Airless blast cleaning operations which are employed in the manufacture of electric parts are covered in bulletin 834. It presents four case histories on cleaning metal castings for electrical machinery, deflashing compression molded plastic components and surfacing electric line and cable fittings.
For More Details Circle No. 155—Page 281

FOUNDRY SERVICES: Springfield Bronze & Aluminum Co., Page Blvd. and Hendee St., Springfield, Mass.—Bulletin illustrates the services, scope of operation and types of work handled by foundry specializing in bronze, aluminum and magnesium casting. Firm offers planning advice and engineering design service, maintains an experimental and development department as well as a fully equipped pattern shop.
For More Details Circle No. 156—Page 281

DC WELDER: Vickers Electric Division, Vickers Inc., 1815 Locust St., St. Louis 3, Mo.—Construction and operation features, performance charts, electrical specifications and ratings, dimensions and weights, and optional accessory equipment for magnetic amplifier rectifier direct current welder are provided in bulletin 7000.
For More Details Circle No. 157—Page 281

SPECTOGRAPH: Baird Associates Inc., 33 University Rd., Cambridge, Mass.—Three-meter concave grating spectograph provides wave-length coverage in single exposure, which is double that of previous models. Complete operating details and specifications for this unit are provided in bulletin 52.
For More Details Circle No. 158—Page 281

GAS SOLENOID VALVE: Automatic Switch Co., 391 Lakeside Ave., Orange, N. J.—General description, application and operation data on low-pressure gas solenoid valve is offered in bulletin 743.
For More Details Circle No. 159—Page 281

CONTROL SYSTEMS: Barber-Colman Co., Wheelco Instruments Division, Rockford, Ill.—Control terminology, rules to use as a guide for se-

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ABRASIVES
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* Microsil Silica Flour
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lection of a proper method of control for process characteristics and an explanation of various types of control systems, ranging from two-position "on-off" to proportional position with automatic reset, are covered in bulletin F6149-2, "Temperature Control Systems."

For More Details Circle No. 160—Page 281

GEAR DRIVES: Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.—Line of parallel shaft gear drives is described in 32-page book No. 2619. Thirty-nine standard size drives together with complete line of baseplates and built-in backstops are listed. Engineering data, simplified horsepower tables, dimensions and overhung load capacities for selection of shaft drives also are included.

For More Details Circle No. 161—Page 281

HAND LIFT TRUCKS: Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill.—Single-stroke hand lift trucks with line drawings pointing out their distinctive features are covered in bulletin 555-1. A number of operating views are included, as are special models for specific applications.

For More Details Circle No. 162—Page 281

SOLENOID VALVES: A-P Controls Corp., 2450 North 32nd St., Milwaukee 45, Wis.—Information on selection, features, coil construction, lift ratings, coil frequencies, liquid capacity and typical applications of a range of solenoid valves is presented in form RS141.

For More Details Circle No. 163—Page 281

INDUSTRIAL TRUCKS: Baker-Raulang Co., 1260 West 80th St., Cleveland, O.—Tables of dimensions, capacities, weights, lift height and other specifications for each model, series and type of industrial trucks in the company's line is included in bulletin 54B.

For More Details Circle No. 164—Page 281

MAGNETIC EQUIPMENT: Eriez Mfg. Co., Erie, Pa.—Bulletin B-207 describes line of magnetic equipment designed primarily for conveying and controlling steel and separating, retrieving and purifying ferrous materials for the metalworking industry.

For More Details Circle No. 165—Page 281

DRY-TYPE TRANSFORMERS: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee, Wis.—Totally-enclosed dry-type transformers with NEMA Group 3 class insulation for indoor or outdoor applications are described in bulletin 61B8222.

For More Details Circle No. 166—Page 281

MECHANICAL SEAL: Garlock Packing Co., Palmyra, N. Y.—Sectional drawings, charts and diagrams of mechanical seals for use on rotary shafts is contained in bulletin AD-150.

For More Details Circle No. 167—Page 281

LUBRICATION PUMPS: Trabon Engineering Corp., 1814 East 40th St., Cleveland 3, O.—Bulletins 5531, 5533, 5535 and 5537 describe a par-

(Advertisement)

Dear Reader:

Don't miss Harry St. John's articles for brass foundrymen! The second in the series for copper-base alloy producers appears in this issue, page 154. The author, formerly superintendent of nonferrous foundries, Crane Co., Chicago, is widely known as an authority in his field.

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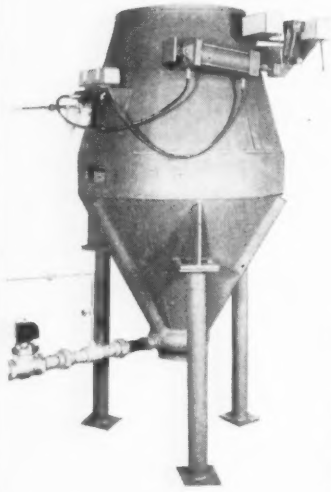

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ticular series of lubrication pumps giving a detailed description of design features, with diagrams and operating specifications of each type. Oil and grease reservoir assemblies are illustrated; dimensions and capacities are tabulated.
For More Details Circle No. 168—Page 281

WELDING ALLOYS: Eutectic Welding Alloys Corp., 40-40 172nd St., Flushing 58, N. Y.—Folder TIS 2496 discusses applications for low heat input metal joining on all base metals. Procedures for many common metal joining jobs are covered. Techniques and alloy recommendations are given for cast iron repair without preheat and for joining steels with extremely high joint strengths.
For More Details Circle No. 169—Page 281

WET DUST COLLECTOR: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Photographs, line drawings and tables in bulletin 919 give data on counter-current, wet dust collector of tower construction. Action of the patented vanes in dispersing liquid to obtain increased capacity in reduced space is described.
For More Details Circle No. 170—Page 281

pH METER: Photovolt Corp., 95 Madison Ave., New York 16, N. Y.—Line-operated pH meter featuring indicating meter of 7-in. scale length covering the entire pH range from 0 to 14 without switching and without reversal of the pointer travel, is described in bulletin 105. Instrument can be furnished as a portable model.
For More Details Circle No. 171—Page 281

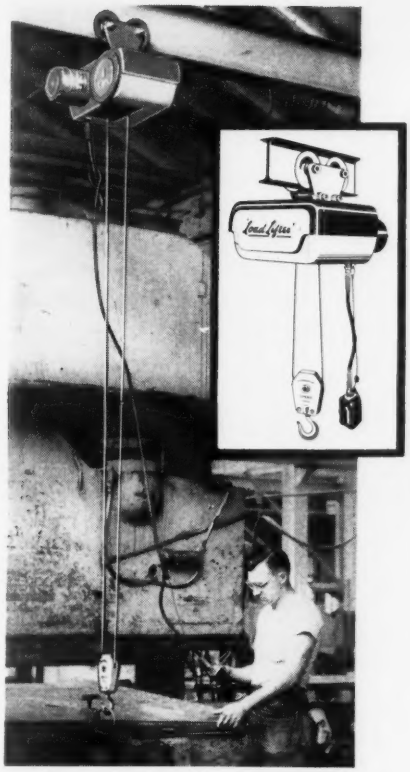
CONTROL SYSTEM: Security Controls Inc., Dept. 6G, 255 Franklin St., Buffalo 2, N. Y.—Electrical control system for predetermined repeat or nonrepeat cycle on any machine with a mechanical tripping mechanism is described in bulletin 55-1.
For More Details Circle No. 172—Page 281

VIBRATING CONVEYOR: Gifford-Wood Co., Hudson, N. Y.—Vibrating conveyor is described and illustrated in 4-page bulletin, with an explanation of its operation and features that make it adaptable for handling flakes, chips, grains, powders or similar bulk materials.
For More Details Circle No. 173—Page 281

FLEXIBLE SHAFT MACHINES: Wyzenbeek & Staff Inc., 223 North California Ave., Chicago 12, Ill.—Catalog 55 describes line of flexible shafts, flexible shaft machines, saw attachments, hole cutters, sanders, arbors, adapters and related items.
For More Details Circle No. 174—Page 281

INDUSTRIAL HEATING: Michigan Oven Co., 415 Brainard, Detroit 1, Mich.—"Handbook of Oven Facts" is designed to provide plant management and engineers with basic concepts of industrial heat processing and heat control.
For More Details Circle No. 175—Page 281

COMPARISON CHART: Electrode Division, McKay Co., 326 McKay Bldg., Pittsburgh 22, Pa.—Compari-



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son chart lists electrode classifications and all major manufacturers' electrodes which fall into each individual class. Chart is intended for welding engineers, supervisors and purchasing personnel in matching brand name electrodes with the A.W.S. class or the A.I.S.I. grade.
For More Details Circle No. 176—Page 281

POSITIONERS: Worthington Corp., Harrison, N. J.—Bulletin R-1700-B15 outlines seven basic points for consideration in selection of positioners for various operations as welding, coating, surfacing, chipping or others where handling and positioning of work is required.
For More Details Circle No. 177—Page 281

MAGNETIC BRAKES: Stearns Magnetic Inc., 612 South 28th St., Milwaukee 46, Wis.—Bulletin 226-D covers standard line of magnetic brakes and clutches with selection data and specifications of a companion line of magnetic brakes for rerated NEMA frame sizes.
For More Details Circle No. 178—Page 281

CYLINDERS AND VALVES: Modernair Corp., 400 Preda St., San Leandro, Calif.—Catalog provides dimension drawings, installation, operating and technical data on full line of air and hydraulic cylinders, valves and packaged units.
For More Details Circle No. 179—Page 281

SEALING RINGS: Precision Piston Rings Inc., 1417-1423 Commerce Ave., Indianapolis 1, Ind.—Technical data and descriptions of the physical properties of alloys used in company's unbreakable piston and sealing rings are discussed in technical brochure.
For More Details Circle No. 180—Page 281

FOUNDRY reprints

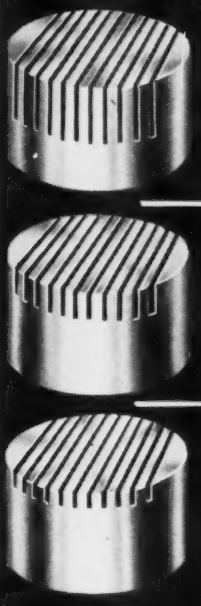
The CO_2 Process . . . Its Use in British Foundries by Arnold Tipper describes the techniques used successfully in several British foundries for production of cores and molds by the carbon dioxide process.
For a Free Copy Circle No. 181—Page 281

Midwest Foundry Specializes in Centrifugal Casting by Edwin Bremer details processes used at Sandusky Foundry & Machine Co., Sandusky, O., in making a wide range of hollow cylindrical tubes which vary in size from 3 to 54 in. in diam, up to 27 ft in length and from 25 to as much as 60,000 lb in weight. Both ferrous and nonferrous alloys are cast.
For a Free Copy Circle No. 182—Page 281

Automated Molding Line by Robert H. Herrmann pinpoints production methods for automated and semiautomated molding lines as well as related foundry sections of the gray iron foundry of Central Specialty Division, King-Seeley Corp., Ypsilanti, Mich. Gray iron castings are used in small woodworking tools and as automotive parts.
For a Free Copy Circle No. 183—Page 281

CORE BOX VENTS

"A Specific Type for Every Core Box"



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The Shakeout

Magnetic Drum Salvages Aluminum

ALUMINUM BORINGS mixed with iron tailings are being salvaged with a permanent, nonelectric magnetic drum by W. F. Jobbins Co., Aurora, Ill. With the equipment formerly employed, tailings had to be rerun during weekends at a cost of four to eight overtime man-hours per working day. The new unit, made by Eriez Mfg. Co., Erie, Pa., eliminates reruns entirely.

The same unit solved a somewhat different problem at Detrex Corp., Detroit. This firm produces degreasers and dry cleaning equipment and has to blast surfaces with either steel or aluminum oxide grit to provide the proper bases for various coatings.

Two blast rooms are located side by side and utilize a common access pit for conveyors, elevators and other equipment. Since even a slight contamination of either blast material by the other results in inferior finish, large quantities of both frequently had to be discarded. Installation of a drum separator where it can be used for 8-hr periods, alternately, has resulted in substantial cost savings and high quality finishes.

For More Details Circle No. 203—Page 281

Cast Stainless Helps Produce Antibiotics

STAINLESS STEEL castings are playing an important part in the production of antibiotics as pumps, valves and fittings. Cast stainless components at the Chas. Pfizer & Co. plant in Brooklyn, N. Y., large manufacturer of terramycin, resist dilute sulphuric acid and other corrosives as well as frequent sterilization with live steam.

The plug valve illustrated here is cast of CF-8 type alloy (nominal composition: 19 per cent Cr, 9 per cent Ni and 0.08 per cent C max), the "general purpose" corrosion-resistant grade. It also is widely used in dairy processing equipment. Other parts are cast of CF-8M alloy (nominal composition: 19 per cent Cr, 10 per cent Ni, 2.5 per cent Mo and 0.08 per cent C max), which has good resistance to reducing corrosive media and is substantially more resistant to pitting corrosion than the CF-8 grade when exposed to solutions containing chlorides. Supplier of the valves is Tri-Clover Machine Co., Kenosha, Wis.

For More Details Circle No. 204—Page 281

Fittings Foundry Installs Mold Blowers

MARKING THE FIRST such installation, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, has installed two of its mold blower units in a fittings foundry as a part of a complete production molding unit. The unit comprises complete facilities for the preparation of sand, mold blowing, pouring, cooling, shakeout and sorting.

The first weeks of pilot operation indicate that casting quality is on a superior level. Currently, 2-in. pipe fittings are being made on the machine, but other sizes also will be produced.

For More Details Circle No. 205—Page 281

Graphic Signals Raise Production Quality

PRODUCTION QUALITY levels are said to be controlled and raised with the aid of a graphic signal made of Bakelite rigid vinyl sheet. Posted in clear view of a worker, the device tells him what the quality level of his work is. The vinyl resists moisture, oils and most chemicals, cleans with a damp cloth and does not warp or support combustion.

When samples of a worker's output have been inspected, the quality level is charted by the inspector (top view) on a chart of graph paper held by the worker's "quality scope." A sliding signal arm at the top is set to measure the product quality level with the

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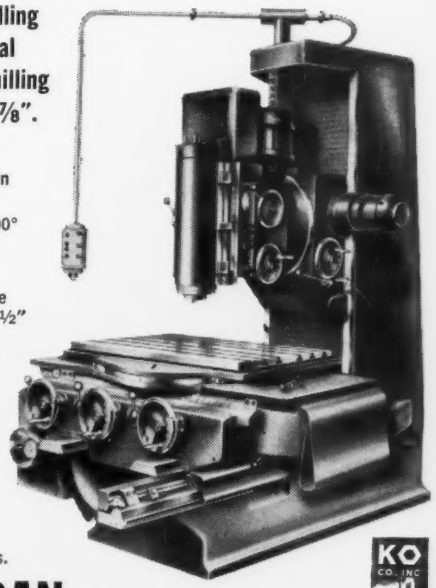

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- Milling head swivels 90° in either direction
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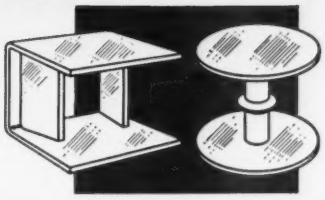

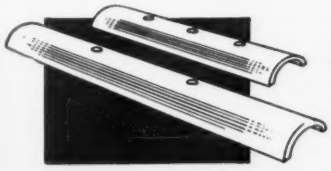

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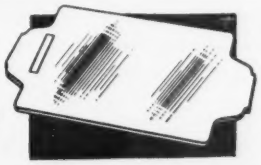

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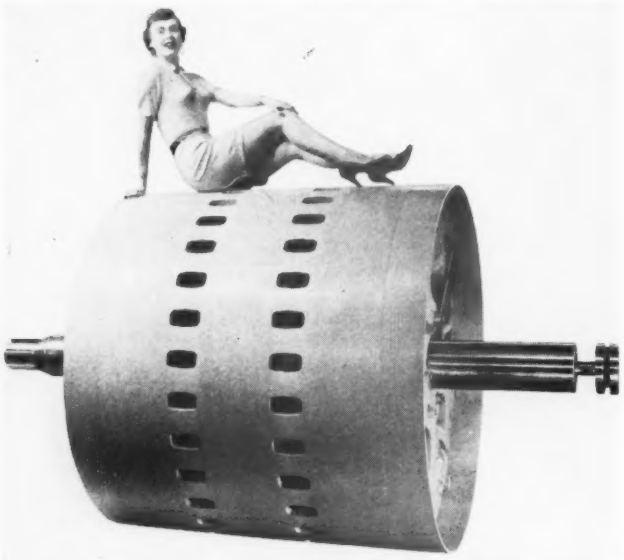
standard of expectancy (bottom view). If quality control levels are within control limits, the signal arm extends from the left of the scope and shows green. If they are out of control, the signal arm extends from the right and shows red.

The quality scope is manufactured by Graphic Calculator Co. and distributed by R. G. Bock Engineers, Chicago.

For More Details Circle No. 206—Page 281

Giant Magnetic Pulley Reclaims Iron

WHAT IS BELIEVED to be the largest magnetic pulley in the world has been manufactured by Stearns Magnetic Inc., Milwaukee. The unit is an electro pulley 60 in. in



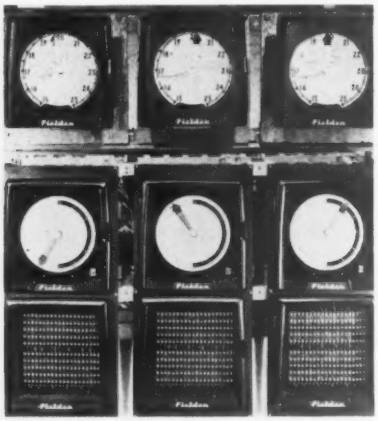
diam with a 60-in. magnetic face. We don't know the young lady's dimensions, but she's pretty magnetic, too.

More than 17 miles of copper wire was used to wind the coils of the magnet. The pulley weighs over 24,000 lb and is supported on a shaft 8 in. in diam. Installed as a head and drive pulley on a conveyor 60 in. wide, it is used to reclaim iron from slag.

For More Details Circle No. 207—Page 281

Scanner Controls Process Variables

AN ELECTRONIC "WATCHDOG" which makes it possible to test and control continuously an unlimited number of industrial processes from a single vantage point has been developed by Fielden Instrument Division, Robertshaw-Fulton Controls Co.



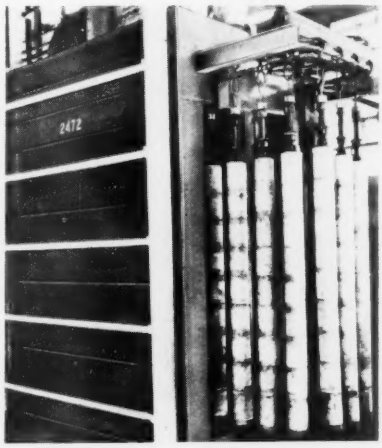
Called an indicating scanner, the new instrument monitors a variety of process variables involving level, temperature, thickness, mechanical movements, tolerances, weight and pressure. It keeps a steady check on 6, 12, 24, 48 and more steps in a manufacturing process, the company states.

The speed of scanning depends largely upon the number of points to be checked, with a maximum rate of one point per second. Where a process strays beyond the preset control zone, the scanning stops at that point and actuates an alarm or flashes a signal. The indicator dial shows the extent of the deviation. Associated control systems may correct the condition automatically.

For More Details Circle No. 208—Page 281

Oven Handles Ladle Stopper Rods

PREHEATING, DRYING AND STORING ladle stopper rods was a melting room problem for many years at A. Finkl & Sons, Chicago, producers of die steel, electric furnace steel, etc. Used to plug the bottom nozzle of ladles which transfer molten steel from furnaces to molds, the rods are 1½-in. steel bars 11 ft long which are protected by nine ceramic sleeves 6¼ in. thick. They weigh 241 lb each.



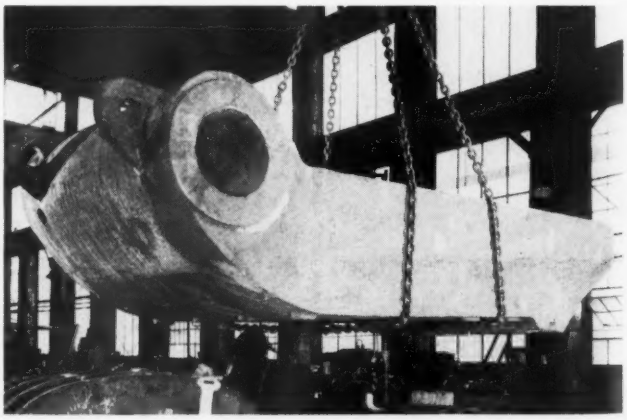
If the rods are allowed to cool and collect moisture before insertion into a ladle, contact with molten steel splinters them, allowing the metal to cut the stopper rod.

Production personnel at the plant decided to try out a Jensen Specialties conveyorized, infrared oven to accomplish both storing and preheating in a single operation. This unit is reported to represent a great improvement over previous methods. It holds heat at constant uniformity with little maintenance.

For More Details Circle No. 209—Page 281

New Technique Increases Chain Strength

NEW METHOD for welding sling chain links calls for inserting and welding separate pieces of steel between the butted ends of each formed link. Weld area is increased 225 per cent, and the weld is said to be stronger than the chain link itself. In addition, the inserted metal



becomes a stop midway in the link, so that kinking is impossible and the chain always hangs straight.

In the view shown here, a ¾-in. chain is handling a 35,000-lb casting for use as a jaw crusher for rock and ore. Even when used on rough castings, the chain develops very little denting or burring of the links, it is claimed. For high-temperature use, the chain is manufactured in stainless and super stainless steel analyses which resist scaling until about 1500 and 1800° F, respectively. Both stand up under acids normally used in pickling. Manufacturer is American Chain & Cable Co., Bridgeport, Conn.

For More Details Circle No. 210—Page 281

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Here is a new performance-tested line . . . burs and rotary files, carbide or high-speed steel, shapes and sizes to meet every need. They're precision-made and proudly marked with the Golden-Circle, symbol of dependable ELGIN quality. Write for your copy of the "Golden-Circle" booklet today!

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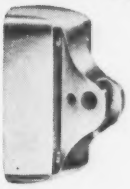
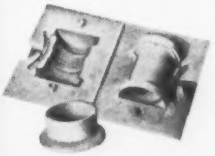
SHELL MOLDING with G-E SHELL RESINS CUTS COSTS

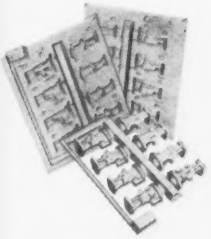


BRONZE DOOR CASES—
"Machining and polishing cut 50%"

YOKES—
"Production time cut 56%—finishing costs 50%"



NICKEL-BRONZE DRAIN HEADS—
"Costly thread-cutting eliminated"



PUMP BODIES—
"Machining reduced or entirely eliminated"

Why are so many foundries turning to shell molding? Why are so many of their customers specifying shell-cast parts? The answer is simple: *Shell molding cuts costs.* Smoother surface finish, greater dimensional accuracy, and greater yield per man-hour are among its advantages over conventional sand-casting methods. (Note the brief testimonials—from G-E files—that tell the story!)

Ask G. E. about shell molding

General Electric offers a number of foundry products to help you get maximum benefits from shell molding: *G-E phenolic shell-molding resins* to form light, dimensionally accurate molds...*G-E silicone parting agents* to secure quick, easy release of molds from patterns...*G-E phenolic bonding resin* to cement shell halves together.

FREE BOOKLET AVAILABLE

How can shell molding help YOU? General Electric, a major supplier of resins and release agents for the shell-molding process, has prepared an informative 28-page booklet telling about the techniques and benefits of this new foundry method. For a free copy of *G-E Shell Molding Manual,* just write to General Electric Company, Section 522-4A, Chemical Materials Department, Chemical and Metallurgical Division, Pittsfield, Massachusetts.

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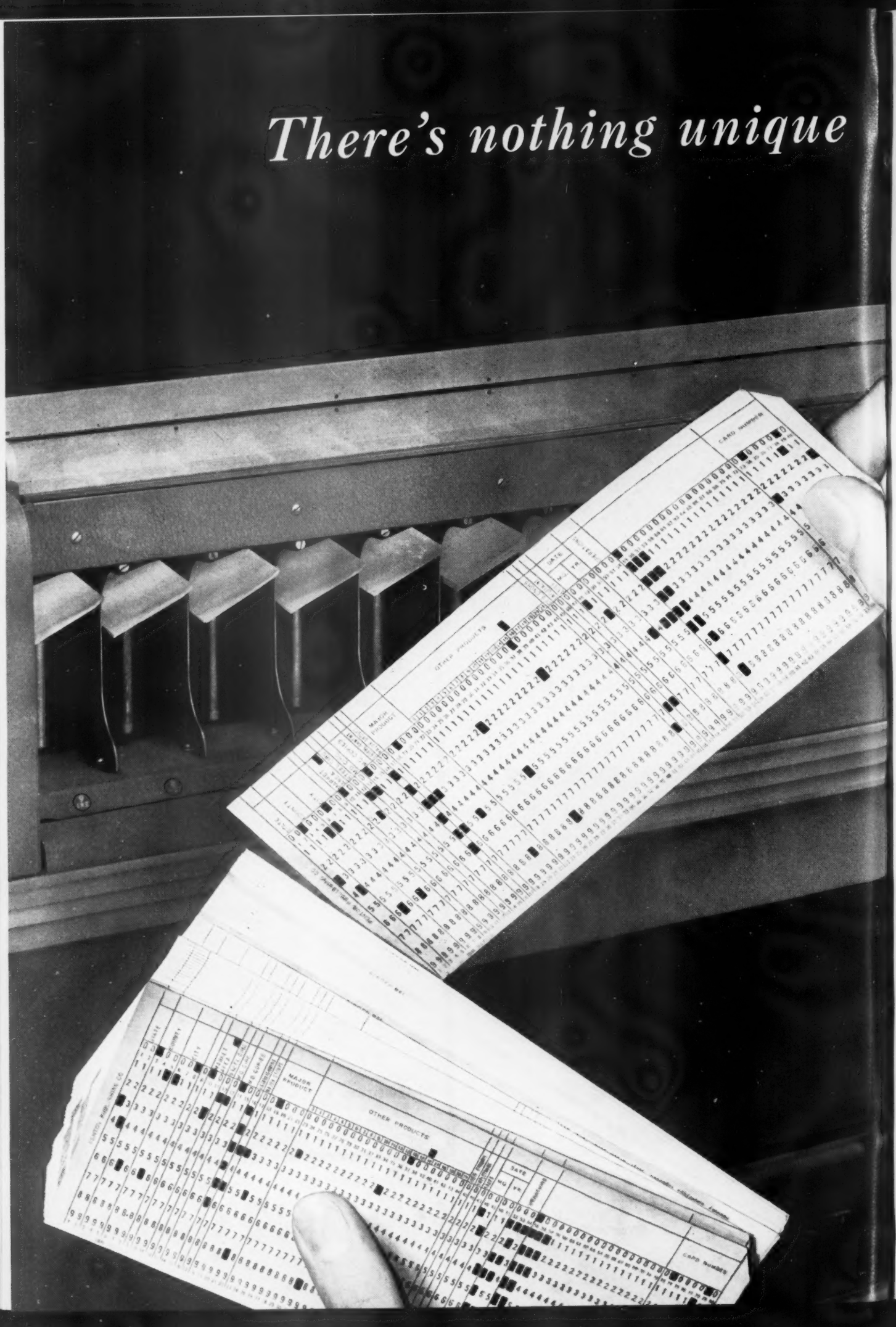
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Plant counts will some day be required from all industrial publishers. Many progressive media buyers request them now. Without this information the advertiser is "flying blind" because he has no means of checking the number of worthwhile units covered (or missed) by a business magazine.

When you're using a PENTON publication you know how many worthwhile *units* are reached. Coverage reported on the S.I.C. basis enables you to measure it in relation to the total number of units. You can evaluate the proportion of the market buying power you are reaching, because information on size or type of establishments is also reported.

The ability to buy coverage in this modern way is just one of the extra values you get *when it's a PENTON publication.*

*All manufacturers use this system in reporting to the U. S. Bureau of the Census.

. . . but there is about the way PENTON uses them

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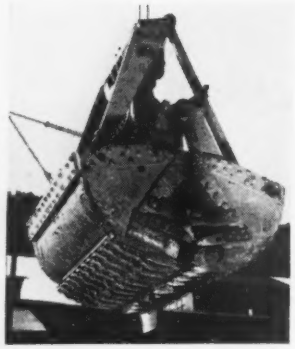
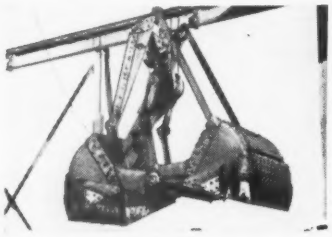


BLAW-KNOX "Shark Tooth" Single-Line Hook-On Buckets cut the cost of rehandling coke, coal, sand, and small limestone because one bucket, with easily attached or removable liner plates, is all you need. With the plates attached, fine granular materials are handled without leakage. Without the liner plates, the "shark teeth" literally finger their way through the coke, so it may be handled with minimum degradation. Hook-On feature permits quick detaching for change to magnet.

Above — Rated 1-cu. yd. closed head type Blaw-Knox "Shark-Tooth" Bucket, without liner plates, reeved 2-parts for 13'6" headroom. Range of sizes for every requirements.

Right — This open head type Blaw-Knox Bucket, rated 1-cu. yd., is equipped with liner plates for rehandling sand, coal, limestone, etc. Shown reeved 2-parts for 8'9" headroom. Choice of sizes.



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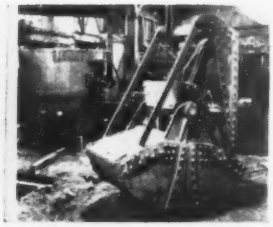
help solve average or unusual conditions



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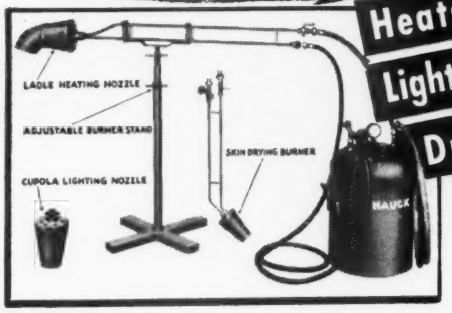

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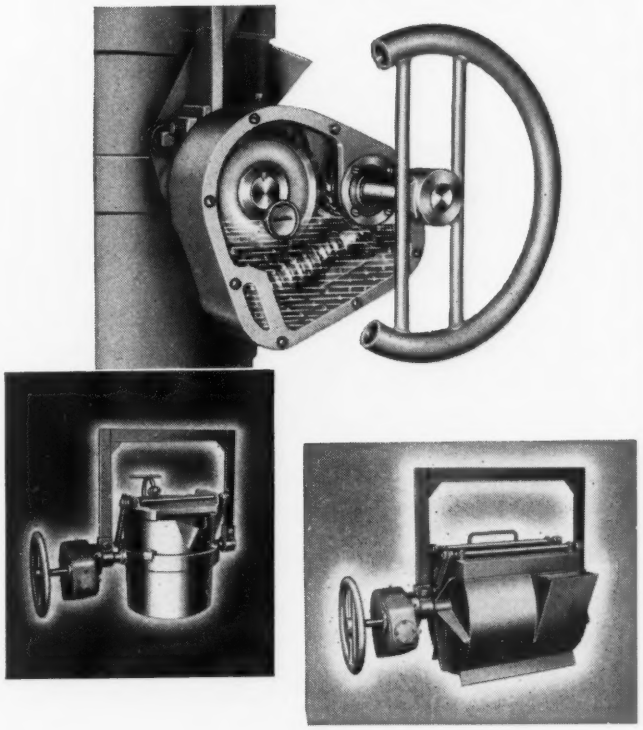

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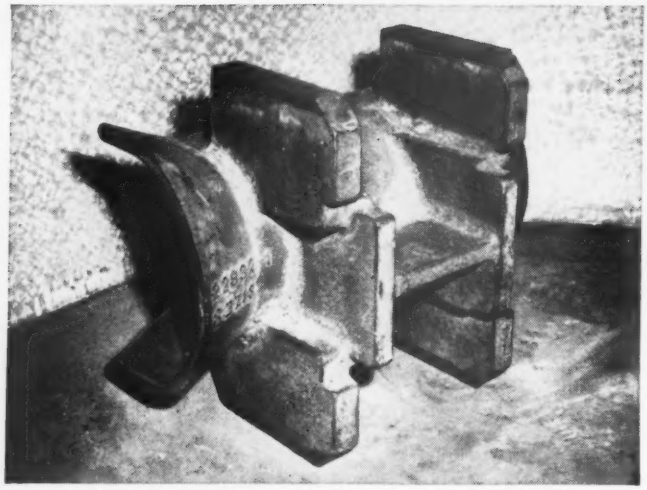

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Invites opportunity to stabilize going business and train logical future manager. Successfully managed five companies—three taken out of the red. Trained two successors, both made good. Qualified to handle complete administrative responsibility and develop all profitable possibilities. Excellent experience foundry, machine and related lines. Address: Box 697, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

INVESTMENT CASTING ENGINEER

Supervised all phases lost wax and plastic process in small shop doing production, development and research as a service to a larger organization. All metals. Familiar with formulation of process materials, evaluation of process changes and development of plant equipment. Chemical Engineer. Read and write German, French and Russian. Available for top-level supervision, development, engineering or research. Address: Box 689, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Twenty-eight years' experience all phases operations ferrous and nonferrous. Fifteen in supervisory positions. Aggressive, capable, age 45. Will relocate. Address: Box 702, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY METALLURGIST

BS degree, thirty years' experience in production of plain carbon, manganese, high and low alloyed steels, electric and induction melting, heat treating, sand control, chemical and physical testing, risering and gating for X-ray quality castings. Address: Box 683, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Position in gray iron or nonferrous. Thirty years' experience, practical and technical. Well versed in all departments, medium-sized jobbing or production. Presently employed as superintendent. Address: Box 663, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested, Address: Box 703, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

SALARIED PERSONNEL

$5000-$30,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, P.O. Box 674, MANCHESTER, VERMONT.

Positions Wanted

EXPERIENCED PRACTICAL FOREMAN

On both steel, iron and manganese steel. Have been general foreman, superintendent and consultant. Can furnish the best reference. Address: Box 694, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Extensive experience in foundry mechanization, design of foundry equipment, layout and time-study. In supervisory position for past five years. Chicago or Milwaukee area preferred. Address: Box 688, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHICAGOLAND REPRESENTATION

Nonferrous foundry representative in Chicago and vicinity would like to represent medium-sized, progressive iron and steel foundries. Address: Box 698, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Graduate Engineer. Varied experience directly in stainless foundry operations includes melting control and other phases. Presently employed. Address: Box 701, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALESMEN

We want several live-wire salesmen who are now working on salary and who think they could increase their earnings by selling on liberal commission. These men must have followings in industries buying master alloys and hardeners. Please give full details in your first letter, i.e., personal history, employment record, territory, etc. Your information will be held in strictest confidence. Address: Box 665, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVES WANTED

To sell quality alloy hand and pneumatic forged chipping chisels and closely related items. Commission basis. Semi-established territories available. No stock necessary. State particulars. Address: Box 691, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALESMAN—CALIFORNIA

Preferably with some Foundry background and/or education, to sell Foundry coke in Southern California area for company established over 100 years. Good salary and benefits. Send personal details and snapshot. Address: Box 670, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHICAGO TERRITORY

Chaplet manufacturer desires representation Chicago territory. Distributor or individual now selling foundry trade. Address: Box 699, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representative Available

FOUNDRY REPRESENTATIVE

Ten years' successful experience, want to represent steel foundry Eastern Pennsylvania, South Jersey. Commission Basis. Address: Box 685, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

The Wagner Permanent Mold Co., 2910 Empire Avenue, Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries regarding this method and process.

PARTNER WANTED

For manufacturing pressure cast patterns, shell molding and core blowing equipment using our hardening process. This special process enables us to manufacture at a saving from 50 to 100% from the standard practices maintaining file hardness, heat and durability three to five times of machined patterns. This allows manufacturers to buy shell molding pattern equipment for reasonable prices. For further information, Address: Box 680, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Available Capacity

AVAILABLE CAPACITY

Steel Foundry. Open jobbing Capacity. Casting weight up to 2200 pounds. Midwest Location.

BOX 668, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

Wanted-To-Buy

WANTED

Gray Iron Foundry located in Ohio interested in producing C.I. Watermain Fittings from Production Metal Cope and Drag Plates. Address: Box 633, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Osborn jolt rollover pattern draw molding machine, either 243W or 643, minimum table size required, 35" x 40" or 35-A or 34-SA Davenport. Address: EAST JORDAN IRON WORKS, INC., EAST JORDAN, MICHIGAN.

WANTED TO BUY

Graduate engineer desires to invest $10,000 and services in operating foundry. Fifteen years' top shop and metallurgical experience including shell molding. Address: Box 669, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

2—Osborn No. 403W jolt rollover pattern draw molding machines, 20" x 50" table, 15" draw. Must be in good operating condition. Address: Box 690, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Wanted-To-Buy

WANTED TO BUY

Sutter Automatic Shell Core and Shell Mold Blowing machine, maximum weight of core 20#.

"Gee" Shell Core and Shell Mold machine, similar to their Model SC-1418.

Shell Bonding fixture, as made by Shell Process, Inc., table 18" x 30", maximum mold height 16".

BOX 636, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANT TO BUY

4 E Demmler Core Blower
2 T Rollover and Draw Machine
276 J Osborn Jolt Squeezer Molding Machine

STERLING CASTING CORPORATION
BLUFFTON, INDIANA
PHONE 1141

MACHINERY WANTED

Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: INSTRUMENT SERVICE COMPANY, INC., HOBOKEN, NEW JERSEY. BA 7-0600.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED TO BUY

1—Dietert #335 or 335-A Permeter in first class condition and not over three or four years old. Address: Box 695, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOUNDRIES FOR SALE

IRON FOUNDRY, 16,000 sq. ft. well equipped for light production work. Land for expansion and good labor area. Eastern Pennsylvania. IRON FOUNDRY, 30,000 sq. ft. 7 acres, heavy cranes, railroad. Produces 10 to 15 tons daily. Steady profitable business.

EDWARD H. ZOLL
FOUNDRIES SOLD AND LEASED
790 BROAD ST. NEWARK 2, N. J.

FOUNDRY FOR SALE (OR LEASE)

Established going gray iron foundry in Wisconsin. Fully equipped; manufacturing own line and general jobbing. Capacity up to ten tons per day. Over $70,000 value. Can be purchased for less than half. Principals only. Terms. Address: Box 662, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SMALL FOUNDRY FOR SALE

Well-equipped foundry in Eastern Pennsylvania. Has overhead crane, cleaning equipment. Plenty of adjacent land. On railroad. Address: Box 696, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Modern established aluminum foundry and product line. Mold, conveyor, overhead sand handling, etc. Good location in Eastern Iowa. Address: Box 671, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Small but completely mechanized soil pipe foundry, located near large city. Address: Box 667, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE OR LEASE

Well equipped brass and aluminum foundry in central Indiana, with living quarters. Address: Box 687, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

WE—BUY—SELL—TRADE

15" Continuous Wheelabrator $4,500.00
36 x 42 Wheelabrator 3,000.00
27 x 36 Wheelabrator (Iron Belt) 2,500.00
Pangborn ES421 Shell Blasting machine (Like New) 3,500.00
Vapor Blasting Machine 750.00
Pangborn 12' Turn Table (Like New)
Pangborn CK220 Dust Collector
Also Pressure Tanks, elevators, blowers, motors, all types and sizes.

ATTENTION CANADIAN BUYERS

We still have two 42 x 48 Wheelabrators in Canada. These can be purchased Duty Free. Priced at $2,500.00 and $3,000.00. Excellent condition. Also 42 x 48 Wheelabrators in Detroit at $950.00 and $1,500.00.

DIAMOND SAND BLAST INC.
5654 WEST JEFFERSON AVENUE
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750

GRANITE SURFACE PLATES

Factory seconds because of slight discolorations in the granite which in no way affects the accuracy or longevity of the plate. New plate guarantee. ½ savings. Ideal for pattern and inspection departments.

3 ft. x 5 ft.	4 ft. x 6 ft.
5 ft. x 10 ft.	6 ft. x 8 ft.
6 ft. x 10 ft.	6 ft. x 12 ft.

Other sizes also available. Write, wire, phone today. Subject to prior sale.

INSPECTION DEVICES COMPANY
5636 S. LAKE PARK AVENUE
CHICAGO 37, ILL.
TELE.: FA 4-2883

FOR SALE

1—FS 347 Ingersoll-Rand Centrifugal Foundry Blower, Serial No. S-347L3, complete with motor. Intake volume 4000 cfm.

1—Type G Ingersoll-Rand Centrifugal Foundry Blower, Serial No. 16G1415D8, complete with motor. Intake volume 2200 cfm.

1—#5½ Roots-Connersville, Figure 8, Impeller Type Foundry Blower, Serial No. 30642, designed for 28.2 cubic foot per revolution at a maximum speed of 220 RPM, without motor.

For further specifications, write

BEDFORD FOUNDRY & MACHINE COMPANY
1108 FIFTH STREET
BEDFORD, INDIANA

FOR SALE

Osborn Jolt Strip Squeeze Molding Machine—#175
Osborn Jolt Strip Squeeze Molding Machine—#71-G-J-1
Osborn Jolt Rollover Squeeze Draw Molding Machine—#432
Redford Bench Core Blower with Air Filter Assembly
Osborn Jolt Rollover Molding Machine

CONTACT: L. H. RAYMOND, P.A.
WESTINGHOUSE ELECTRIC CORP.
1216 WEST 58th STREET
CLEVELAND, OHIO

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.

OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

MOTORS — GENERATORS
TRANSFORMERS

Unused — Rebuilt
WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P. O. Box 51 — Rochester 1, New York

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

For Sale

FOR SALE

MOLDING MACHINES

1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—SPO #305 Jolt Stripper.
2—No. 275 Osborn jolt squeezers. Stationary.

CORE OVENS

1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.

BLOWERS FOR CUPOLAS AND FURNACES

1—Connersville Rotary Blower, 3500 CFM.
2—Spencer Turbine, 30 HP, 3000 CFM, 24 oz.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
1—Connersville rotary blower 22 x 66 45 cu ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS

1—Beardsley & Piper Model S Screenerator.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—Sly Tumbler 24" x 40".
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

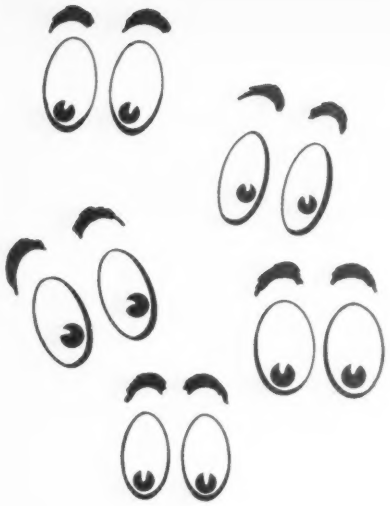
Heller Universal type 26" cold saw, excellent condition, used little, complete. Wired 220/3/60. Includes Heller automatic saw sharpener and ten saws.

BOX 606, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

One Ingersoll-Rand Type FS-563 Blower. Direct connected and roller pedestal bearing construction. Serial #S563-J-10, 11,000 CFM, 1.5 lbs. pressure, 3500 RPM complete with 100 HP Fairbanks Morse motor, Type QZC. 3450 RPM. Used only a short time.
Several 42" Dia. x 72" Type "C" Sly Tumbling Mills. Direct and V-Belt Drives, with or without motors.
Both items very reasonably priced.

NEW HAVEN FOUNDRY
NEW HAVEN, MICHIGAN



HAVE YOU EVER NOTICED the numerous types of headings under which classified ads are listed? Whether interested in obtaining qualified personnel, selling used machinery, wanting to buy equipment, or are yourself looking for a better position, you should seriously consider advertising in the classified section of FOUNDRY MAGAZINE.

•

FOUNDRY has 45,000 readers which cover the entire foundry industry. That means that for a nominal sum you get the widest possible coverage of the industry and your advertisement reaches "just the right people".

•

The Classified Staff is equipped to handle all details in the placement of your ad.

Classified

ADVERTISING DEPT.
FOUNDRY
CLEVELAND 13, OHIO

For Sale

FIRST CLASS EQUIPMENT AT BARGAIN PRICES

CORE BLOWERS

Osborn—Model 91, 193, and 94
Redford—Bench type—with clamps $150.00

GRINDERS

U. S. 7½ HP 3 speed 28" wheel $500.00
Marschke 10 HP, Swing Frame

MOLDING MACHINES—JOLT, SQUEEZE, STRIP

Osborn, 724 & 726 PJ, 4000 lb.
Milwaukee, 143, 163, and 183, 1500 lb.
Nicholls, Type D, 1500 lbs.

MOLDING MACHINES—JOLT SQUEEZE

Osborn, #275
Spo, Model 110 J
Nicholls, Type B

MOLDING MACHINES—JOLT ROLLOVER

International—Type G Size 30 x 12
International—Type F Size 31 x 12
International—Type RES
Spo—Model 506
Tabor—30" Shockless type
Osborn—#601, 602, and 605
Osborn—#2047-4

MISCELLANEOUS

Beardsley & Piper—#50 Sandmixer
Climax Wire Straightener—#2
Beardsley & Piper Screenerators—Model S
2000 lb. Fisher & Strohman Tilting Melting Furnaces
Dielectric Core Ovens

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
TELEPHONE: EXPRESS 1-8930

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32oz.	Ing.-Rand	380	16oz.	No. Am.
4700	32oz.	Ing.-Rand	340	20oz.	A-B
2700	16oz.	Spencer	320	12oz.	Spencer
2500	7 oz.	Sturt.	9000	6"SP	Northern
1150	20oz.	No. Am.	3420	8"SP	N.Y.
800	13oz.	Buffalo	2500	½"SP	American
500	12oz.	Buffalo	2344	2"SP	Clarage
			1100	4½"SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

#17 Besly Grinder
Stroman Economelt (Reverb) 800#, Gas Fired
Tabor Jolt Rollover 30 x 40 table. 14" draw
U. S. Electric Tool Grinder, 5 H.P. and two back stands with guards
2—Tabor Jolt Squeeze Machines, 10"

KING FOUNDRY & MFG. CO.
307 EAST 6th STREET
CHASKA, MINNESOTA

FOR SALE

Mold and sand handling equipment for four squeezer stations. Includes four hoppers, sand conveyors and mold conveyors. Ideal for a non-ferrous foundry. Never used equipment at a sacrifice price. Address: Box 677, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

1 Pangborn Dust Collector—Type 435CH2 with Spark Arrestor, Area 1080 Sq. Ft. Capacity 3240 CFM—220 V Motors, Fan and Controls Complete. Age about 15 years. Used very little, very cheap. Address: KEEN FOUNDRY COMPANY, GRIFFITH, INDIANA.

FOR SALE

Turbo Blowers with Motors
1—GE, 4500 CFM, 16 oz....$500.00
1—Spencer, 6750 CFM, 16 oz..$750.00
Excellent Condition

GLAZER BROTHERS
ANDERSON, INDIANA
PHONE 7713

For Sale

FOR SALE

Wheelabrator Tumblast 36" x 42".....$3000
Wheelabrator #1—4' Table $1000
Wheelabrator Cabinets, 35' x 12'—will take pieces up to 25' by 8". Power skewed conveyor for rotating work under blast area $4250
Wheelabrator Cabinet, 20' x 8'—will take pieces up to 15' by 6". Power conveyor as above $3750
Pangborn 6LF Rotoblast Table—6'.....$1750
Pangborn Rotary Table. 4' $850
Sly Sand Blast Barrel—18" x 20" w/collector, motor driven $450
Pangborn, MacLeod, Lieman, Sly, and Ruemelin Sand blast cabinets and generators .....$100 up
Tabor #22 Hydraulic Jolt Rollover—22" x 42" table. 10" draw. Air Clamps..... $550
10—Osborn 2047-4 Jolt Rollovers—18" x 24" table. 8½" draw..... $275
10—Tabor 10" squeezers $100
Berkshire 10" Jolt squeezer—Never used... $225
Redford #1 core blower $150
Gehnrich 10' x 9' x 10' core oven.....Offer
B & P #40 Speedmuller—Air operated door $1000
American Stock Core machine & cutter, motorized $200
Gogan Electric Brinell Tester—4500KG $450
Curtis Air Cylinder Hoists—500 to 1000 lbs. .....$35 up
Marschke 5 H.P. swing grinder $250
Spencer Turbo Blower—16 oz-800 CFM-5 HP $225
North American Blower—16 oz.-90 CFM.. $150
American Dustube #185—16,650 CFM—25 HP motor and blower $1750
Rotoclone, Sludge type, 2500 CFM—5 HP motor & blr $750
25—Pangborn, Sly, American Dust Collectors in stock from 700 to 20,000 CFM.

M. ELSTEIN
422-426 GRAND ST.
JERSEY CITY 2, N. J.

FOR SALE

1 Roots Rotary Positive Blower, 20x44 type HD Serial 11279
1 AC 40 HP 700 rpm motor for same
1 Air Filter
1 Square D Switch
1 Hand Starting GE Compensator
1 #7 Whiting Cupola

1 lot of various steel chains for use with cranes

Following air hoists. 4000# capacity Serial A-19548, 6000# A-32371, 4000# A-29042, 4000# A-23787, 1000# 27136, all Ingersoll-Rand. 6000# A-13676, 6000# A-211401, 4000# 163004, 10,000# 114, all Chicago Pneumatic.

4 Exhaust fans 30 to 48" blades with louvres and motors.
One lot of assorted core plates, large and small

1 Whiting Charging Crane with Cone type bucket.

1 M-1250 Bondactor machine complete with water tank and hose for lining cupola.
4 Hess welded steel heating furnaces. Model 130 complete with oil burner and fire box.

PYOTT FOUNDRY & MACHINE CO.
328 N. SANGAMON STREET
CHICAGO, ILLINOIS
MONROE 6-0295

FOR SALE

72—24 x 2 x 2 37C-16 S5V Norton grinding wheels
48—24 x 1½ x 2 37C-16 S5V Norton grinding wheels
1—24 x 3½ x 2 37C-16 S5V Norton grinding wheel

Surplus stock. Make offer.

OHIO MALLEABLE DIVISION
The Dayton Malleable Iron Co.
COLUMBUS 16, OHIO

SAND DRYER FOR SALE

14' DIA. 20' LONG BARTLETT-SNOW STYLE M ROTARY SAND DRYER, SELF CONTAINED WITH GAS BURNER, CYCLONE, STEEL FRAME. LIKE NEW, $3900.

DARIEN CORP.
60 EAST 42ND ST.
NEW YORK 17, NEW YORK

FOR SALE

Forty heavy steel buckets with overhead bale and locking device. 26" diameter x 32" high. Address: AMERICAN MALLEABLE CASTINGS COMPANY, BOX 514, MARION, OHIO.

For Sale

FOR SALE

American Wheelabrator, swing table 86" diameter, complete with motors and control panel. Practically new.

Reda #550 series combination oil fired-hydraulic tilting furnace, with tank.

Beardsley & Piper motive type sand slinger 19" head adjustable liner—6'0" arm, 11'0" conveyor arm, 12'0" on center bucket elevator, 31 buckets.

PYOTT FOUNDRY AND MACHINE CO.
328 NORTH SANGAMON STREET
CHICAGO 7, ILLINOIS

FORK LIFT TRUCKS

Slightly used, completely reconditioned.

CLARK, TOWMOTOR AND ROSS.
Capacity 2,000 to 10,000 lbs.

. . . .

3,000 to 4,000 lb. Clark and Towmotor, solid rubber tires...$1,245.00

BEN WINER TRUCK AND EQUIPMENT
591 NORTH MAIN STREET
AKRON, OHIO
FRANKLIN 6-9246

FOR SALE

The equipment listed is almost new and priced to sell!

6—Osborn type 2047—jolt rollover and pattern draw—size—24" x 24".

2—International clamp and draw—76" x 9½" draw.

1—Kane and Roach core wire straightener—No. 5 DX—⅜" capacity.

All equipment can be inspected at our warehouse and immediately available.

GLOBE TRADING COMPANY
1815 FRANKLIN STREET
DETROIT 7, MICHIGAN
PHONE: WOODWARD 1-8277

For Sale

NEVER USED
PERFECT CONDITION
SANDSLINGER EQUIPMENT

Beardsley Piper Stationary Sandslinger, double belt type, Serial S-676-5403, 5'0" First arm, 4'0" Rowing unit, 19" Diameter Impeller Head, 4" tip, 220 volt, two speed 16/25 H.P. 1200/1800 RPM Rowing Motor. Floodlight.

Beardsley Piper 8-Ton Roto-Feed, 5 H.P. Totally enclosed, fan-cooled, high torque, 55° C rise continuous duty motor. Serial #F-334-5403.

Model 920 RCX, Johnston & Jennings Rol-A-Draw Molding Machine, 2000# capacity, Pattern Draw 20". Serial JJM-238-5403.

30' Link Belt Bucket Elevator, outside 48" x 24", inside 42" x 17¾", Bucket size 12" x 7" x 7¼", new bearings, Motor and gear drive overhauled. Excellent condition.

WHY WAIT FOR DELIVERY WHEN YOU CAN HAVE IMMEDIATE SHIPMENT.

BOX 630, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR QUICK SALE

1—American 79/60 Model M Sandcutter—220 V-3-60

1—American 74/50 Model AM Sandcutter—220 V-3-60

(Inventory of parts with each)

1—International 14 x 6 RES—Rollover

1—International 14 x 5½ PKL—Jolt Squeeze P.L.

(Both in unused condition)

1—Pangborn 8'—180 TYPE RF-22 Roto Blast cleaning table with dust collector and large inventory of spare parts.

BOX 684, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

For Sale

FURNACES
FOR SALE
COMPLETE—LIKE NEW
IMMEDIATE DELIVERY

G.E. ROLLER HEARTH 850 KW 1650° F., 5' wide, 18" high, 35' long, 80' cooling.
G.E. ROLLER HEARTH 465 KW, 1650° F., 5' wide, 18" high, 20' long, 40' cooling.
G.E. PUSHER 240 KW, 1650° F., 4' wide, 12" high, 22' long, quench conveyor.
4000 C.F.H. EXO GENERATOR with each above furnace.
YOUNG BROS. GAS RECIRC. CONVEYOR BELT, 1000° F., 6' wide, 24' high, 45' long. NEVER USED.
UDYLITE DIPPING MACHINE, 1-12 station rotary type.
UDYLITE 1-14 station rotary zinc plating unit.
DRYING SYSTEM OVEN 450° F., 13' wide, 7' high, 64' long.
DRYING SYSTEM OVEN 150° F., 10' wide, 9' high, 52' long.
500 C.F.H. Westinghouse Endothermic Generator.
SURFACE COMBUSTION GAS BOX, 30" wide, 18" high, 36" long, 1800° F.

PAPESCH & KOLSTAD, INC.
10707 CAPITAL AVENUE
OAK PARK (DETROIT 37) MICH.
PHONE LINCOLN 1-1100

FOR SALE

1—"Modern" #4 Cupola, motor, blower.
1—International Type G, air rollover machine, 24" table, 10" draw.
1—"Modern" 1000# Geared, covered cylindrical ladle.
Many other items, send for Bulletin #34.

SOMIL EQUIPMENT & SUPPLY CO.
620½ MARQUETTE AVE.
SO. MILWAUKEE, WIS.
PHONE: BR 1-7060

FOR SALE

Size 1½ Whiting Cupola. Dismantles. $500.00. B. F. Sturtevant No. 7 Noiseless Blower, for cupola, furnaces or forges. $250.00. Address: ALVA F. ALLEN, CLINTON, MO., PHONE 1286.

ELECTRIC

Melting Furnaces

LARGEST STOCK IN THE COUNTRY

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

1—Chicago 3000# Electric Furnace, tilt back head. 4" electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell 8 ton 9' diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Detroit Electric with 350# and 1000# tapered shells, 2300 V Kuhlman Transformer. Complete with panelboard and bus bars.

Herrault 2000# Side Charge, complete with Pennsylvania 1500 KVA transformer, 12,000 volt primary and 150-90 volt secondary. New control panel; new Field

Rheostat, new motor generator set-ball bearing, 25 HP 3/60/440 V/1800 rpm, 250 V compound wound. With 51 nipples and sufficient roof brick for almost six roofs.

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We will buy for cash a single piece of equipment or your entire foundry

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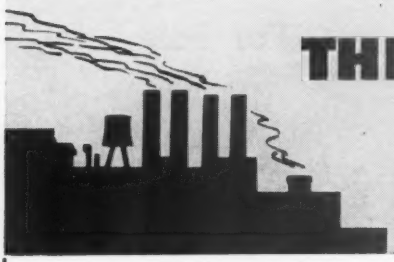
MONA



THE ACME *bargain page*

Stop and See our complete stock when you visit the Machine Tool Show in Chicago, September 6th to 17th.

AIR COMPRESSORS

Chicago Pneumatic 50 HP direct motor driven Type P-4.

Chicago Pneumatic 2 stage horizontal 24″ x 14″ x 18″. 3600 CFM 800 HP 2200V. Synchronous motor, M.G. set, Intercooler, After cooler and starting panel.

Ingersoll-Rand 1200 CFM, XB. Imperial 2 stage 22″ x 13″ x 16″, Intercooler, Aftercooler, 200 HP 220V.

Ingersoll-Rand 800 CFM. Imperial type 10-2 stage 18″ x 11″ x 16″, 170 HP 220V motor starting compensator.

BLOWERS

Ingersoll-Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.

General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.

Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.

CLEANING EQUIPMENT

Sly 8′ dia. Table Shot Blast Unit.

36 x 42 Halloway 7½ HP shot motor elevator and dust collector.

CORE BLOWERS

3—International SB 12.
4—International SB 13.
1—Osborn 93.
12—Osborn 193.
1—Osborn 2035-2.
1—Peterson (Similar to Demmler #50).

CORE OVENS VERTICAL HORIZONTAL

1—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.

1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min cycle. Present replacement cost over $90,000.

GRINDERS, SNAGGING

5—Hammond 10 W R I Double End Snag. Grinders 20″ dia. wheels, 10 HP 220/440 V motors, variable speed drives.

3″ x 24″ U.S. #65, 20 HP 220/440V.

GRINDERS, SWING FRAME

2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

HOT METAL CARRIER SYSTEM

7—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers 800′ Arch Beam Rail.

MOLDING MACHINES

Jolt Squeezers:

13—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″ x 20″ table.

7—Champion JS10P Portable Jolt Squeeze molding machine, 18″ x 21″ table.

8—Osborn 275J.
1—Spo 110J.

Jolt Squeeze Pin Lifts BIG ONES:

2—International PK 20's. 20″ squeeze cylinder 8″ draw. Ser. #67237. New 1949.

1—Osborn 712 PJ. Stationary Jolt Squeeze pin lift 18″ x 28″ table, 12″ squeeze cylinder, 6″ draw.

2—Milwaukee Jolt Squeeze Strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.

1—SPO 214 Jolt Squeeze Pin Lift.

1—Milwaukee 126-3 Jolt Squeeze Pin Stripper, 27″ x 21″ table, 8″ draw.

ROLLOVERS—

Jolt Rollover Pattern Draw

1—Herman 4000# Series 30″ x 60″ table, 32″ x 48″ bumper.

1—Herman 3000# Series 40″ x 84″ table, special slotted table.

1—Herman 1500# Series 20″ x 36″ table.

2—Herman 750# Series 20″ x 30″ table.

2—Herman 750# Series 20″ x 24″ table.

All the above have air clamps rollout tables.

2—Champion JM-18-8 Jolt Rollovers, portable 13½″ x 20″ tables.

1—Davenport 24 SA Jolt Rollover Pattern Draw. 26″ x 42″ flask size, 12″ draw.

3—Spo Model 9032.
1—Milwaukee 217.

Jolt Pin Lifts:

Pin Lift Pushoffs:

2—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.

MULLERS AND MIXERS

1—Link Belt Double Screw-Mixer, 50 ton per hour.
1—Link Belt Single Screw Sand Mixer.
Simpson #3 Type H open gear type.
Simpson #3 Muller with bucket loader.
Simpson #3 Open Gear type, $1000.

OVENS, MOLD OR CORE

Porbeck Double Car Single door 16′ long 14′ wide 9′ high gas fired 600° recirculating complete with 7½ HP car puller, in place St. Louis, Mo.

Core Oven Electric 68″ x 42″ high, 65″ deep 100°-650°.

POURING DEVICES

13—Pouring devices, Whiting 750# and 1500#.

PREPARATOR

B&P #70 Preparator. Only used 3 months.

SHAKEOUTS

Link Belt 3 x 5.

SAND SLINGER

B&P Stationary Slinger with bucket elevator to 10′ x 10′ x 6′ sand storage bin, conveyor feeder to double belt head 19″ head single speed.

TUMBLING BARREL

2—Whiting 36″ x 60″ tumbling barrel driven by 15 HP Jones motor reducer. Individual clutch on each barrel. Can be separated.

WIRE STRAIGHTENERS

Climax #3 Wire Straightener ¼″ to ¾″ dia. wire. 2 HP.

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MONA

2 BUCKET CONVEYORS 56′ centers, 8 ply x 20″ belt, 18″ x 8″ x 7″ buckets, complete with drives

5 STEEL APRON CONVEYORS

1—120′ centers x 36″ wide Midwest
1—57′ centers x 30″ Palmer-Bee "Kantleak" variable speed.
1—44′ centers x 30″ wide Link-Belt
1—19′ centers x 30″ wide Palmer-Bee
1—5′6″ centers x 30″ wide Palmer-Bee
1—30″ and 36″ flat belt, troughing, bucket steel apron.

3 FLAT BELT CONVEYORS 2—30″ x 45′ x 110′, 1—36″ x 35′

1 SAND MULLER, B-P #30 and #70, 7 cu. ft. Mulbaro

2 CUPOLAS #11 Whiting, 1—#3½ Modern

1 BELLEVUE ANNEALING FURNACE—Oil fired all controls, box type 36″ wide x 72″ deep x 24″ high, overall 69″ wide, 88½″ deep, 71″ high. Height clearance required 10′.

LARGE MOLDING MACHINES

Davenport 40A, 40SA, 34SA, 28SA, 34AJS
Johnston & Jennings Model 815
Herman 40″ x 60″ 6000 lbs.
Osborn 405-95—26″ draw
Jolt Squeeze Strip—Nichols 24-54D
Jolt Pin Lift—Davenport, Nichols, Osborn, Spo, Milwaukee, Herman

We carry all makes and types of foundry equipment in stock. Send for our complete listing.

. . SPECIAL SALE . .

1 complete gray iron foundry, 18000 sq. ft., #7 Whiting cupola.
80 miles southwest of Cleveland

MISCELLANEOUS MOLDING MACHINES

Rollovers: 1—Spo Model 9336, 800# Cap., 22″ x 28″ table, 9½″ draw.
2—Tabor 22″ x 32″ table, 10″ draw, 600 lbs. cap., air clamps.
4—International Type G, Air Rollover, Foot draw, 600#, size 24″ x 10″.
6—International Type RJ, size 20″ x 8″, Air jolt.
4—International Type R, size 20″ x 8″.
3—Champion Type W22″ and W16″, 12″ and 8″ draw, hand rollover.

Pushoff: 1—Osborn 3′ x 16′ table.
2—Champion 38″ x 40″ table, 10″ draw.

JOLT SQUEEZERS
HAYNES
MILWAUKEE 124-6, 103
OSBORN 210PJ, 275J, 276J
SPO 110PJ, 113PJ

Jolt Strippers: 3—International LP-6, 8″ draw, 1000 lbs. jolt.
1—Milwaukee, 2800 lbs, jolt, 32″ x 38″ table, 12″ draw.
2—Milwaukee, 900 lbs. jolt, 17″ x 21″ table, 6″ draw.

Jolt Squeeze Pin Lift: 1—Milwaukee 145-1, 1700 lbs. jolt, 14″ squeeze cyl., 8″ draw, 25″ x 30″ table.
6—Milwaukee, 600 lbs. cap., 4″ draw, 17″ x 21″ table.
2—Osborn 814-P, 700 lbs. jolt, 8″ draw, 14″ squeeze cyl.
5—Osborn 720U, 600 lbs. jolt, 4″ draw, 11″ squeeze cyl.
1—Osborn 721U, 900 lbs. jolt, 6″ draw, 13″ squeeze cyl.

Jolt Plain: 1—International Type J, 3000 lbs. jolt, 36″ x 48″ table.
1—International Type J, 10,000 lbs. jolt 76″ x 76″ table.
1—Tabor Model B-4, 700 lbs. jolt, 18″ x 24″ table.

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OFFERING . . . .

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AIR & ELECTRIC HOISTS

12—**INGERSOLL-RAND** RC-7 Air Bloc Type, 700 lb. cap., w/roller chain.
194 **INGERSOLL-RAND** RC-5 Air Bloc Type Air Hoists, 500 lb. cap., with roller chain, chain buckets pendant throttle controlled.
25—**INGERSOLL-RAND** Air Hoists, Sizes A, B, D, D-6 and E, 500 to 10,000 lb.
1—**ELECTRO-LIFT** 3000 lbs cap. 4 HP
1—**SHAW-BOX** Load Lifter Jr. 1000 lbs

CORE BLOWERS

1—#2 **DEMMLER.**
2—#92 **OSBORN.**
2—#193 **OSBORN.**
1—#91 **OSBORN.**
1—#192 **OSBORN.**
2—CB-400 **CHAMPIONS.**
6—**MILWAUKEE**—Taccone Model A-3.
5—**REDFORD** #1 Bench Type w/cartridges.

CUT-OFF SAWS & STRAIGHTENERS

1—**TESSMER** Model H Sprue Cutters.
1—**CLIMAX** #2A Wire Straightener.
1—**DEWALT** Model Me2V Foundry Type Cut-Off Saw with 10 HP motor.

CORE OVENS

1—**FOUNDRY EQUIPMENT** 4 Compartment 6′ x 8′ x 10′ each, gas fired with controls, recirculating, like NEW.
1—**INDUCTION HEATING** Dialectric Model M-800A, 600 lbs. per hour 300 hrs. use.
1—**INDUSTRIAL** Continuous Type, trays 18″ x 80″ long, overall 83″ high, gas fired recirculating.
1—**DETROIT** Vertical Tower 45′ high, 4½′ pit, racks 14″ w x 60″ long, 31″ centers w/2 adjustable shelves per rack.

CUPOLA BLOWERS & ACCESSORIES

1—**BASIC REFRACTORIES BRI** Gun, Model A10 (similar to Bondactor).
1—**FOXBORO** Air Weight Controller.
1—**HAUCK** Lighter Tank & Torch.
1—**WHITING** No. 6 Cupola.
1—**ROOTS CONNERSVILLE** Rotary Positive Blower, size 5½, with 40 HP.
1—**INGERSOLL-RAND** Centrifugal Type FS-367 with 100 HP motor.
7—Furnace Blowers 1-3-5-7½ HP, 16 oz.

DUST COLLECTORS & ROTO-CLONES

1—**AMERICAN AIR FILTER** No. 14 Type W arrangement "C" with sludge ejector.
1—**AMERICAN AIR FILTER** No. 27 Type W arrangement "C," with sludge ejector.
1—**AMERICAN AIR FILTER** Type N, Size 10 with No. 14 Roto-Clone & sludge ejector. Grinding Bench type.
1—**AMERICAN AIR FILTER** Type N Size 20, 20,000 CFM, with 75 HP motor.
1—**AMERICAN AIR FILTER** Type N, Size 24, 24,000 CFM, 75 HP motor.

ELECTRIC MELTING FURNACES

5—**DETROIT** Type AA Rocking 750 to 1000 lbs, w/325 KVA Transformers.

GAS & OIL FIRED FURNACES

1—**LINDBERG-FISCHER** MNP Size 1000, gas or oil w/3 HP motor & blower.
3—**LINDBERG-FISCHER MNP** Size 2400 lbs gas or oil fired, motorized, complete.
1—**LINDBERG-FISCHER MNP** Size 225 lbs, gas or oil, w/motor-blower etc.
2—**LINDBERG-FISHER** Type BBI, 400 lb crucible type, hand tilt, gas or oil.
1—**STROMAN** Model U, 600 lbs Reverberatory, tilting, gas or oil fired.
2—**STANDARD** #30 & #150 Crucible, Stationary, gas or oil, w/motor-blower.
11—**HAUSFELD** #200 Crucible, stationary, gas fired, NEW 1952.
1—**STROMAN** Model NP, 125-175 Crucible, Mechanical Tilt, gas fired.
2—**CAMPBELL-HAUSFELD** IPNT Iron Pot Type, 2000#'s Cap. gas or oil.

G. E. INDUSTRIAL X-RAY

Model KX 10, Type 1, 115 volts, 50/60 cycles, 13 amps. Serial 425456.

GRINDERS—SWING—SNAGGING—STAND

2—**FOX** #5 High Speed Stand, wheel 24″ x 3″—10 HP motor.
1—**FOX** #7 High Speed Stand, wheel 30″ x 3″—15 HP motor.
1—**HAMMOND WR-1** Double End Snag, wheel 24″ x 3″—10 HP motor.
1—**U. S.** Electric Swing Frame, 15 HP, 2 speed, wheel 24″ x 3″ x 12″.
6—**U. S. ELECTRIC** #65 Snag Grinder, 15 & 20 HP—4 speeds, wheel 30″ x 4″.
2—**U. S. ELECTRIC** #64 Snag Grinders, 7½ hp, adjustable speed, wheel 14″ x 3″.

LADLES & POURING DEVICES

6—**INDUSTRIAL** Lip Pour 24″ x 24″ rated 1600 lbs. enclosed Timken Gearing.
4—**MODERN** 1500 lb. Cylindrical Type, 29″ x 30″, w/bails, covers & stands.
10—**WHITING** Models 1000 & 2000 Pouring Devices w/400 lb ladle, hand tilt.
3—**WHITING** 275# Cylindrical Type V-bail, 19″ diam x 16″ length, covered.
1—**WHITING** 10 ton lip pour, enclosed gear.

INDUCTION MELTING—HEAT TREATING

1—**LEPEL** 30 KW Spark Gap Converter w/controls & 20 lb furnace & stand.
1—300 KW **G.E.** alternating current generator, 800 volt, 3600 RPM, 1 phase with 450 HP G.E. motor & controls.
1—**LINDBERG** Model 4860 GH, Cyclone Type gas fired, with all controls.
1—**GENERAL ELECTRIC** 1250 kva Induction M.G. set 3000 cycles, with 1850 HP

MOLDING MACHINES

2—**HERMAN** Jolt Rollover Pattern Draw, 6000 series, 42″ x 78″ table, 6000 lbs.
2—**HERMAN** 40″ x 60″ Plain Jolt.
1—**INTERNATIONAL** PKL Jolt Squeeze Strip, 18″ x 24″ table, 6″ draw.
1—**INTERNATIONAL** LP-10 Jolt Pin Lift.
1—**JOHNSON & JENNINGS** #815 Jolt Rollover Pattern Draw, 30″ x 40″ table.
1—**JOHNSON & JENNINGS** 612RBP Jolt Rollover Pattern Draw, table size 24″ x 30″, 12″ draw, 600# capacity.
1—**MILWAUKEE** No. 1536 Jolt Pin Lift table 32″ x 38″, 1500 lb. jolt, 12″
1—**MILWAUKEE** No. 125-3 Jolt Squeeze Pin Lift, table 21″ x 27″, 1200# jolt
2—**OSBORN** #710J Jolt Squeeze Pin Lift, 16″ x 25″ table, 6″ draw, 10″ squeeze.
1—**OSBORN** No. 563-9 Jolt Pin Lift 55″ x 63″ table, 12″ draw, 7000 lbs. Jolt.
1—**OSBORN** #342-1 Jolt Rock-Over Pattern Draw, 23″ x 38″ table, 10″ draw, 1000#.
2—**OSBORN** #405 Jolt Rollover, table 57″ x 64″, 26″ draw, 3000 lbs jolt w/rollout.
4—**OSBORN** #210 PJ Jolt Squeezers.
4—**OSBORN** #40 & #42 Core Rollovers.
1—**OSBORN** 710PV Vibrating Jolt Squeeze Pin Lift, table 16″ x 25″, 6″ draw.
2—**SPO** #507 Jolt Rock-Over Pattern Draw, 32″ x 40″ table, draw 10 to 20″.
1—**SPO** #508 Jolt Rock-Over Pattern Draw, 28″ x 30″ table, 9″ draw, 1200# jolt.
2—**TABOR** 22″ x 42″ Jar Rollovers.
2—**TABOR** 30″ x 40″ Jar Rollovers.

MATERIAL HANDLING EQUIPMENT

1—**FARQUHAR** 18″ x 35′ portable Trough.
1—**FARQUHAR** 18″ x 19′ Car Unloader.
500′—**MATHEWS** Gravity Roller Conveyor, 10″—16″—18″ width FOUNDRY TYPE.
1—**LINK-BELT** Overhead Conveyor, 100′ track, chain, trolleys, curved, motorized.
1—**ELECTRIC BRIDGE** Crane, 25′ span, with 2 ton R & M Hoist, 150′ track.
1—**JEFFREY** Trough Belt Conveyor, 75′ centers, belt 24″, with motor drive.
1—**JEFFREY** Trough Belt Conveyor, 103′ centers, 24″ wide, with 18″ x 24″ magnetic pulley motor & drive.
3—**LOUDEN MONORAIL SYSTEMS,** "Super Track" (1) 110′ of 6″ I-beam & two 20′ bridges (2) 140′ of 6″ I-beam & two 12′ bridges (3) 130′ of 11″ I-beam & two 30′ bridges; all complete.
1—Power Crane, 25′ span, 120′ runways 12″ beam, Tramrail Hoist.

SHELL MOLDING

1—**B & P** Fully Automatic Shell Investment Unit. Pattern size 20″ x 24″ w/dolly, heater plate, injector station & electric oven. Never used, cost $11,000.00.

SAND MULLERS

1—**BEARDSLEY & PIPER** #60.
1—**BEARDSLEY & PIPER** #50, Speed Muller w/skip hoist, dust hood, 50 HP.
1—**BEARDSLEY & PIPER** #70.
1—**CLEARFIELD** #404, cap 4 cubic feet.
1—**CINCINNATI** Lab Muller ¼ HP motor.
1—**SIMPSON** #1½, Style B separate drive, enclosed gears w/skip loader.
3—**SIMPSON** #2 style UD—skip loader.
1—**SIMPSON** #2F, Style UD, 80″ pan dia., 2000 lb. batch size, 30 HP motor, with skip hoist, aerator, water meter.

SAND PREPARATORS

1—**B & P** #70 Portable Preparator w/gyrating screen, aerator, magnetic separator, 90 cu. ft. hopper.
1—**AMERICAN** Model AM Sand Cutter, size 69/45.
1—**AMERICAN** Model BD Sand Cutter, size 75/60.
1—**AMERICAN** Sand Cutter, Model AA, 6′0″, Serial No. 643, power all around.
6—**BEARDSLEY & PIPER** Models S, M and L Screenerators.
8—**ROYER** Sand Conditioners, all models, Jr., NC-2, NDP, C-2, etc., portable.
1—**SIMPLICITY** Model LP 2′ x 3′ Screen.

SAND SLINGERS

1—**B & P** 19″ Tractor Type, 13′ arm.
1—**B & P** 16″ Tractor Type, 13′ arm, magnetic tower, 4′ ramming 4″ tip.

SHAKEOUTS & SCREENS

1—**ROYER** Combination Shakeout & Sand Conditioning unit, serial #ST-47.
4—**SIMPLICITY** 4′ x 6′ Model B, 5000#.
1—**SIMPLICITY** 4′ x 10′ Model D with Automatic Crusher, 15,000# load.
3—**SIMPLICITY** 3′ x 6′—Model BG, 5000#.
1—**SIMPLICITY** 6′ x 8′ Model DE.
1—**SIMPLICITY** 8′ x 10′ Model D, Dual Unit w/2—4′ x 10′ units, cap. 32,000#.

SCALES

1—**FAIRBANKS MORSE** Open Dial, 4′ x 5′ platform, 6000 lb. capacity.
1—**TOLEDO** Open Dial 4′ x 5′ platform, 6000 lbs capacity.
1—**TOLEDO** Floor Type Platform, open dial, 200# capacity.

TUMBLING BARRELS

2—**SLY** 42″ x 72″ Square, with 10 HP Gearhead motor—magnetic brake.
1—**SLY** 24″ x 38″ Type C w/7½ HP motor & reducer.
1—**ROYERSFORD** 36″ x 60″ w/motor & drive.

WHEELABRATORS & TABLAST

1—**AMERICAN** 36″ x 42″ Tumblast, skip hoist dust collector. NEW 1951.
1—**AMERICAN** 42″ x 48″ Tumblast, with skip hoist.
1—**AMERICAN** 27″ x 36″ Tumblast with skip hoist loader.
1—**PANGBORN** 6 LG-14 Rotoblast table 6′, with (6) 24″ tables, new 1952.

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AIR COMPRESSORS

1—40 HP SULLIVAN, Model B-Bim #8, WL 60 w/Receiver.

BLOWERS

1—85 HP G.E. Cupola Blower, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT

1—AMERICAN #1MULTITABLE, 6 aux. tables 15", main table 45".
1—ROBBINS SHAKEOUT 4' x 2'.
1—PANGBORN #3½ GK ROTOBLAST.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
5—US GRINDERS, double end, 10, 15, 20 HP.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.
1—TABOR CUT-OFF Saw, 10HP.

CONVEYORS

4—SAND ELEVATORS, various sizes.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS

1—WHITING, #4.
2—WHITING #6, Complete with Skip Charger.
1—MORRIS #9, w/skip, mixing ladle, never used.
1—WHITING #5, w/Blower & Air weight Control.
1—MODERN, #3, 46' shell, w/blower.
2—#11, with complete charging system, latest design.
1—SKIP CHARGER, 3 bottom drop buckets, scale for #9 cupola.

CORE BLOWERS

1—CB-400 CHAMPION. 1—3K DEMMLER.
1—#55 DEMMLER. 1—#92 OSBORN.
1—FEDERAL, San-Blo.
6—#2 DEMMLER. 2—#2 BEDFORD.
1—SB 13 INTL.

FLASKS & CORE PLATES

400 TONS, CAST STEEL, STRUCTURAL STEEL and STERLING TYPE FLOOR FLASKS—ALL SIZES.
20 TONS, FLAT STEEL and PERFORATED STEEL CORE PLATES. SEND FOR COMPLETE LISTINGS.

FURNACES—DIRECT ARC MELTING

1—250#/hr. Hydraulic Top Charge.
1—500#/hr. MOORE.
1—1 Ton WHITING Top charge.
1—2 Ton SWINDELL, Top charge.
1—1000# SWINDELL.
1—2 Ton WHITING top charge.
2—3000# HEROULTS.
1—2 Ton HEROULT.
1—6 Ton HEROULT.
Several 3 Ton to 10 Ton capacity Side and Top Charge Furnaces.

FURNACES—INDIRECT ARC

2—200# cap. DETROIT, complete.
3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—750# LFY DETROIT.
2—800# BAILEYS.
1—60# DETROIT, complete.

FURNACES—INDUCTION MELTING

1—330 KW AJAX w/2 1000# furnaces.

1—20KW AJAX Spark Gap High Frequency, 17 lb. capacity in steel.
1—25 KW AJAX HIGH FREQUENCY M. G. SET with CONTROLS, 50# CAP.
2—60 KW, AJAX-TAMA-WYATT, Alum.
1—80 KW, GE, 9600 Cy., MG Set.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
2—150 KW AJAX-WYATT, 1300# bronze.
1—30 KW LEPEL, 5# crucible.
1—3 KW AJAX, Lab. type.

FURNACES—OIL AND GAS

1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—SKLENAR 600#, Oil fired.
7—HAUSFELD 1000#, tilting, oil fired.
1—HAUSFELD Tilting, 1200# Mag.
1—R & S Convection Draw, Car bottom, 18' l x 8' w x 5' h, oil fired, dismantled, controls.

LADLES & POURING DEVICES

2—6 TON TEAPOT, Worm Geared.
2—WHITING 3 Ton, Bottom pour.
4—10 TON BOTTOM POUR, 55" x 55".
2—15 TON BOTTOM POUR, 65" x 59".
2—45 TON TREADWELL, Excellent.
1—20 Ton lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES

1—SHELL-O-MATIC Shell Molding Machine.
2—HERMAN ROLLOVERS, 750#.
1—HERMAN ROLLOVER, 1500#.
1—SPO Port, Jolt Rollover, #506-1.
8—OSBORN #275J Jolt Squeezers.
5—MILWAUKEE Jolt Pin Lift 32" x 38".
2—MILWAUKEE Jolt Squeeze Strippers, #163.
1—J & J #612 Port. Rollover, 24" x 30".
1—J & J #815-B Rollover.
3—INTERNATIONAL "G", 24 x 10" Jolt Rollovers.
5—OSBORN Jolt Rollovers, Hand Draw, #142.
3—TABOR Squeeze in Head 16" x 18".
1—OSBORN #243 Jolt Rollover.
1—OSBORN #559 Jolt Stripper, 25" x 30".
1—DAVENPORT 28SA, 28" x 40".
3—HERMAN Rollover & Jar, 6000#, 60" x 80".
2—HERMAN JOLT ROLLOVERS, 3000#.
11—DAVENPORT #30-T Jolt Strippers.
2—TABOR POWER ROLLOVERS, #2232 w/clamps, late.
1—TABOR Jolt Stripper, 20" x 20", 4" draw.

MULLERS AND MIXERS

2—SIMPSON #3, UNIT DRIVE.
1—SIMPSON #3, enclosed gears.
2—SIMPSON #2, Unit Drive.
2—CLEARFIELD #610 and #920.
1—CLEARFIELD, #404.
1—BEARDSLEY & PIPER #60 SPEEDMULLER, 60 HP motor, SKIP-LOADER.
1—B & P #40 SPEEDMULLOR.

OVENS

1—TOWER CORE OVEN, 14" x 60" trays, 45' high, gas fired, dismantled.
2—ROSS 2 comp., rack, gas, 6½ x 14 x 7.
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—YOUNG BROS. 3 compartment, kiln type electrically heated, with CONTROLS.
1—YOUNG BROS. 2 compartment, drawer type, oil or gas, 82" h x 12' w x 6' l.

SAND CUTTERS

5—AMERICAN SAND CUTTERS.
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

SAND LABORATORY EQUIPMENT

1—TEST CORE BAKING OVEN #606.

SAND PREPARATORS

1—REDDY SAND UNIT. HANDY SANDY.
2—JEFFREY SANDITIONERS, Portable.
2—ROYER SAND BLENDERS, 16" belt, 12" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired #552.

SAND SLINGERS

1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER STATIONARY, 19" head, 8 ton plate feeder and hopper, NEVER USED.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
1—PORTABLE SLINGER, 16" head, 4' long, on Truck.

TESTING MACHINES

1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINELL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—RIEHLE, BRINELL HARDNESS, hydraulic, 3,000 KG.
1—ROCKWELL HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

TRUCKS

2—HOUGH PAYLOADERS, Model HA, Hydraulic Trip.
2—BELL PRIME MOVERS, 1000# capacity, gas driven.

IN ADDITION: We are now liquidating several large foundries. Send your requirements today. We'll fill them!

UNIVERSAL MACHINERY AND EQUIPMENT CO.

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320 East Broad Street
Shillington, Reading, Pa.

JOSEPH P. SPANG JR.

Portrait by Fabian Bachrach

"A majority of the employees at Gillette..."

"The United States Savings Bonds program is good for the personal security of the bond buyer—good for the security and economy of the Country. A majority of the employees at Gillette Safety Razor Company purchase Savings Bonds the payroll savings way. Under this plan they find it easy to save a tidy sum for retirement years, to pay that unexpected bill, or meet the expense of other emergencies that arise."

JOSEPH P. SPANG JR., ***President***
The Gillette Company

If less than 50% of your employees are enrolled in the Payroll Savings Plan . . . if you have not conducted a person-to-person canvass in the past two years *(or if you do not have the Plan)*, act now! Telephone, wire or write to Savings Bonds Division, U. S. Treasury Department, Washington, D. C. You will hear promptly from your State Director, who will be glad to help you conduct a person-to-person canvass that will put an application blank in the hands of every employee. That is all you have to do. Your employees will do the rest. They want to save for their personal security.

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ADVERTISING INDEX

A

Abrasive & Metal Products Co., The Peninsular Grinding Wheel Div. . . . 59
Abrasive Shot & Grit Co., Inc. 305
Accurate Match Plate Co. 209
Acme Aluminum Alloys, Inc. 321
Acme Foundry Co. 325
Acme Resin Corp. 247
Adams Co., The 53
Aeroquip Corp. 307
Air Reduction Co., Inc. 60
Ajax Electric Co. 44
Ajax Electric Furnace Co. 44
Ajax Electrothermic Corp. 44
Ajax Engineering Corp. 44
Ajax Flexible Coupling Co., Inc. . . . 78
Allen Industrial Products, Inc. 235
Allied Chemical & Dye Corp., Baker & Adamson Products, General Chemical Div. 331
Allied Chemical & Dye Corp., Semet-Solvay Div. 232
Allis-Chalmers 75
Alloy Metal Abrasive Co. 87
Alvey-Ferguson Co., The, of Cincinnati 208
American Air Filter Co., Inc. 43
American Bridge Div., United States Steel Corp. 101
American Chain & Cable, Wright Hoist Div. 55
American Gum Products Co. 327
American MonoRail Co. 184
American Optical Co., Safety Products Div. 94
American Smelting & Refining Co., Federated Metals Div. 217
Anderson Pattern, Inc. 312
Archer-Daniels-Midland Co., Foundry Products Div. 4, 5
Atlas Aluminum Plate Co. 99

B

Babcock & Wilcox Co., The, Refractories Div. 273
Bailey, William M., Co. 276
Baker & Adamson Products, General Chemical Div., Allied Chemical & Dye Corp. 331
Baker Perkins, Inc. 31
Baker-Raulang Co., The 207, 216
Barium & Chemicals, Inc. 245
Baroid Div., National Lead Co. 89
Bartlett, C. O., & Snow Co., The Back Cover
Basic Refractories, Inc. 261
Bay State Abrasive Products Co. 228, 229
Beardsley & Piper Div., Pettibone Mulliken Corp. . . . 211, 212, 288, 289
Belmont Smelting & Refining Works, Inc. 280
Beryllium Corp., The 186
Blaw-Knox Co. 324

C

C & S Products Co. 174
Campbell-Hausfeld Co., The 12
Carborundum Co., The Inside Front Cover, 275, 304
Carl Mayer Corp., The 215
Carman, Edwin S., Inc. 324
Carpenter Brothers, Inc. 314
Carrier Conveyor Corp. 205
Carver Foundry Products Co. 8
Catalin Corp. of America 28
Centrifugal Casting Machine Co. . . . 328
Cerro De Pasco Corp. 332
Chicago Eye Shield Co. 230
Chicago Wheel & Mfg. Co. 169
Christiansen Corp. 29
Cincinnati Milling Machine Co., The, Cincinnati Milling Products Div. . . 16, 17
Cities Service Oil Co. 189
City Pattern Foundry & Machine Co. . . 224
Clark Equipment Co., Construction Machinery Div. 80, 81
Clark Equipment Co., Industrial Truck Div. 39, 265
Clayton Silica Co. 316
Clearfield Machine Co. 38
Cleveland Crane & Engineering Co., The, Cleveland Tramrail Div. 88
Cleveland Flux Co., The 173
Cleveland Metal Abrasive Co., The . . 242
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 88
Cleveland Vibrator Co., The 283
Climax Molybdenum Corp., The 241
Combined Supply & Equipment Co., Inc. 319
Crescent Brass & Pin Co. 287
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co. 56

D

Davenport Machine & Foundry Co. 104, 105
Dayton Pneumatic Tool Co. 324
DeBardeleben Coal Corp. 324
Deister Concentrator Co., The 306
Delta Oil Products Co. 9
Delta Power Tool Div., Rockwell Mfg. Co. 98
Demmler, Wm. & Bros. 57
Despatch Oven Co. 301
Detroit Electric Furnace Div., Kuhlman Electric Co. 65
Dietert, Harry W., Co. 291
Dings Magnetic Separator Co. 233
Dow Corning Corp. 96
Durez Plastics Div., Hooker Electrochemical Co. 225

E

Eastern Clay Products Dept., International Minerals & Chemical Corp. 48, 49
Eastman Kodak Co., X-Ray Div. 221
Eaton Chemical & Dyestuff Co. 332
Electric Furnace Co., The 314
Electro Metallurgical Co., A Div. of Union Carbide & Carbon Corp. . . . 30
Elgin National Watch Co. 321
Erie Strayer Co. 258

F

Fanner Mfg. Co., The 97
Federal Foundry Supply Co., The 2, 200, 201
Federated Metals Div. of American Smelting & Refining Co. 217
Flexible Steel Lacing Co. 308
Foundry Equipment Co., The 22, 23
Foundry Services, Inc. 100
Foundry Supplies Mfg. Co. 18
Fox Grinders, Inc. 213
Fremont Flask Co., The 64

G

General Electric Co. 321
Giffels & Vallet, Inc. 176, 177

Continued on Page 344

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ADVERTISING INDEX

Girdler Co., The, A Div. of National Cylinder Gas Co. 92
Gordon, Claud S., Co. 283
Great Lakes Carbon Corp., Electrode Div. 74
Great Lakes Foundry Sand Co. 187
Great Western Mfg. Co. 345
Green, A. P., Fire Brick Co. 293
Grindle Corp. 259

H

Hanna Engineering Works 86
Hauck Mfg. Co. 326
Haylco Controls Corp. 308
Herman Pneumatic Machine Co. 254, 255
Hevi Duty Electric Co. 286
Hickman, Williams & Co., Inc. 234, 299
Hines Flask Co., The 238, 239
Holcroft & Co. 309
Hooker Electrochemical Co., Durez Plastics Div. 225
Hough, Frank G., Co., The 37
Hydro-Blast Corp., The 310, 311
Hyster Co. 47

I

Illinois Testing Laboratories, Inc. 305
Imperial Belting Co. 10
Industrial Crane & Hoist Corp. 19
Industrial Equipment Co. 329
Industrial Gloves Co. 272
Ingersoll-Rand 295
International Minerals & Chemical Corp., Eastern Clay Products Dept. 48, 49
International Molding Machine Co. 270, 271
International Nickel Co., Inc., The 330

J

Jeffrey Mfg. Co., The 203
Johns-Manville 188
Johnston Mfg. Co. 312
Joy Mfg. Co. 36, 76

K

Kane & Roach, Inc. 252
Keokuk Electro-Metals Co. 24
Kirk & Blum Mfg. Co., The 58
Knight, Lester B., & Associates, Inc. 82
Koch, George, Sons, Inc. 277
Kuhlman Electric Co., Detroit Electric Furnace Div. 65
Kurt Orban Co., Inc. 319
Kwik-Mix Co. 237

L

Lanly Co., The 6
LeRoi Div. of Westinghouse Air Brake Co. 54
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp. 71
Link-Belt Co. 61
Liquid Carbonic Corp., The 171
Lithium Corp. of America, Inc. 46
Logan Co. 290

M

Magnaflux Corp. 50
Mahon, R. C., Co., The 21
Manhattan Rubber Div. 62
Manning, Maxwell & Moore, Inc. 317
Marietta Concrete Corp., The 20
Marquette Mfg. Co., Inc. 332
Master Pneumatic Tool Co., Inc., The 330
May-Fran Engineering, Inc. 41
Mid-West Abrasives 223
Miller Fluid Power Co. 91
Milwaukee Chaplet & Mfg. Co. 108
Minnesota Mining & Mfg. Co. 73
Modern Equipment Co. 346
Monsanto Chemical Co., Plastics Div. 13
Mullite Refractories Co., The 106
Murphy, Jas. A., & Co., Inc. 327

N

National Cylinder Gas Co., The Girdler Co. Div. 92
National Dust Collector Corp. 284
National Engineering Co. 26, 27
National Lead Co., Baroid Div. 89
National Lead Co., Titanium Alloy Mfg. Div. 329
National Metal Abrasive Co., The 299
Newaygo Engineering Co. 84, 85
Newcomb-Detroit 331
Nicholls, Wm. H., Co., Inc. 11
Nichols Engineering & Research Corp. 102
Nomad Foundry Equipment Div. of Westover Engineers 304
North American Refractories Co. 180
Norton Co. 42, 51, 198
Nugent Sand Co., Inc., The 250

O

Ohio Crankshaft Co., The 52
Ohio Electric Mfg. Co., The 330
Olin Mathieson Chemical Corp., Industrial Chemicals Div. 72
Oliver Machinery Co. 331
Orefraction, Inc. 262
Osborn Mfg. Co., The 191, 192, 193, 194
Ottawa Silica Co. 226

P

Pangborn Corp. 15, 196, 231
Pekay Machine & Engineering Co. 93
Peninsular Grinding Wheel Div., The, Abrasive & Metal Products Co. 59
Penn Iron Works, Inc. 294
Penola Oil Co. 206
Petersen Oven Co., The, Stroman Furnace & Engineering Co. Div. 251
Pettibone Mulliken Corp., Beardsley & Piper Div. 211, 212, 288, 289
Pickands Mather & Co. 297
Pittsburgh Coke & Chemical Co. 40
Pittsburgh Crushed Steel Co. 326
Pittsburgh Lectromelt Furnace Corp. 79
Pittsburgh Metals Purifying Co. 66
Planet Corp. 67, 68, 69, 70
Plastic Engineering Co. 45
Presstite Engineering Co. 298
Pyle Pattern & Mfg. Co. 267

R

Raybestos-Manhattan, Inc. 62
Redford Iron & Equipment Co. 107
Republic Coal & Coke Co. 326
Rietz Lumber Co. 328
Robeson Process Co. 327
Rockwell Mfg. Co., Delta Power Tool Div. 98
Rotor Tool Co., The 274
Roura Iron Works, Inc. 303
Royer Foundry & Machine Co. 165

S

Sall, George, Metals Co., Inc., The 14
Schmieg Industries, Inc. 249
Schneible, Claude B., Co. 32
Semet-Solvay Div., Allied Chemical & Dye Corp. 232
Service Conveyor Co. 319
Shalco Engineering Corp. 325
Shallway Corp. 325
Shell-O-Matic, Inc. 296
Sidley, R. W., Inc. 330
Simonds Abrasive Co. 77
Simplicity Engineering Co. 95
Sly, W. W., Mfg. Co., The 292
Smillie, C. M., & Co. 317
Smith Oil & Refining Co. 268
SPO, Inc. 63, 218, 219
Standard Conveyor Co. 222
Standard Electrical Tool Co., The 256
Steel Shot & Grit Co. 326
Steel Shot Producers, Inc. 280
Sterling Wheelbarrow Co. 110, 306
Stevens, Frederic B., Inc. Inside Back Cover
Stroman Furnace & Engineering Co. Div. of The Petersen Oven Co. 251
Superior Pattern & Mfg. Co. 302

T

Tabor Mfg. Co., The, Div. of Turbo Machine Co. 103
Tamms Industries, Inc. 302
Titanium Alloy Mfg. Div., National Lead Co. 329
Tousey Varnish Co. 285
Turbo Machine Co., The Tabor Mfg. Co. Div. 103

U

Union Carbide & Carbon Corp., Electro Metallurgical Co. 30
Union Carbide & Carbon Corp., Linde Air Products Co. 71
United States Graphite Co., The, Div. of The Wickes Corp. 7
United States Rubber Co. 90, 236
United States Steel Corp., American Bridge Div. 101
United States Steel Corp., Subsidiaries 101
Universal Clay Products Co., The 328
Universal Engineering Co. 83

V

Vanadium Corp. of America 109

W

Wedron Silica Co. 303
Westinghouse Air Brake Co., LeRoi Div. 54
Westover Engineers, Nomad Foundry Equipment Div. 304
Wheelabrator Corp. 25, 183, 257
Whirl-Air-Flow Corp. 316
Whitehead Brothers Co. 35
Whitehead Metal Products Co., Inc. 214
Whiting Corp. 1
Wickes Corp., The, The United States Graphite Co. Div. 7
Willson Products, Inc. 195
Woodward Iron Co. 167

Table of Contents, Page 3

Classified Advertisers, 333, 334, 335, 336, 337, 338, 339, 340, 341

Step ahead in this five billion dollar market with

Foundry's

PLUS 5 SERVICE

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries

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Penton Building, Cleveland 13, Ohio

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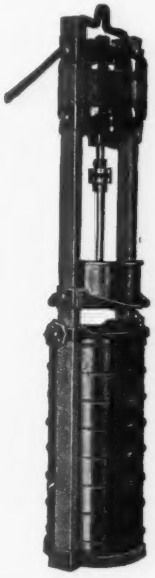
FOR A QUICKER START TO SAVINGS

Combs Gyratory Foundry Riddles combine smooth, even motion with fast, low-cost operation! Whether you screen core or molding sand, you'll find that Combs Riddles provide thorough sifting, mixing, aerating—whatever the job calls for.
Write today for illustrated folder which describes just the Combs Riddle for your plant.

TYPE "V"
with 20″ sieve
also made with
36″ sieve



TYPE "HL"
LAB SIFTER
for sand control

TYPE "CS"
with 24″ square
screen and automatic discharge

TYPE"CR"(Illus.)
with 24″ sieve

These Combs Foundry Riddles cost less than 1¢ an hour for power. You can remove the steel rim, empty it and replace it in just seconds. You save up to 97% on your labor costs.

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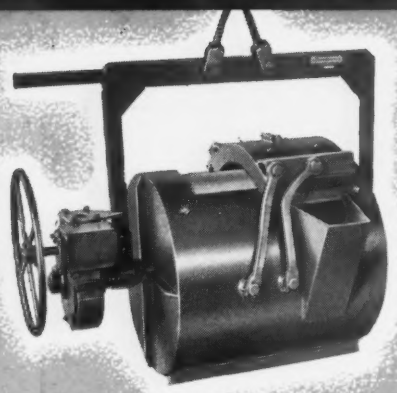
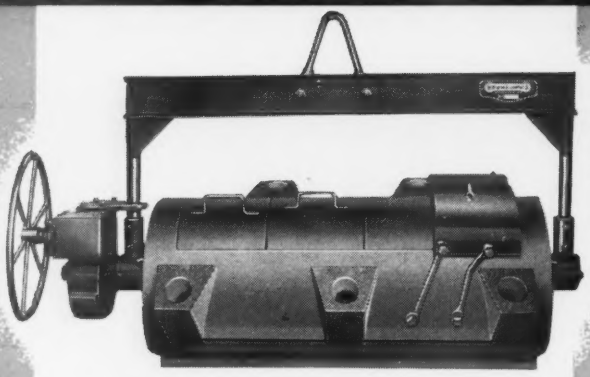
GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS

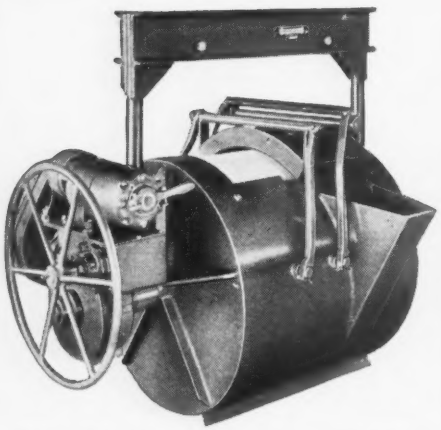


MODERN 800 lb. Geared, Covered and Insulated Cylindrical Ladle with square bail and crane-hook eye.



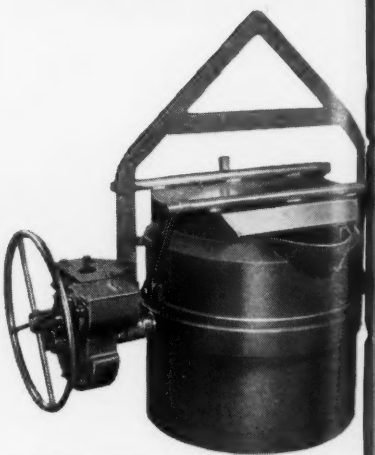
MODERN Special, 1500 lb. Covered and Insulated Geared Ladle with 5 Spouts.

MODERN 800 lb. Geared, Covered, Sing Sided Ladle with Square Bail and Cra Hook Eye. Cover in open position.



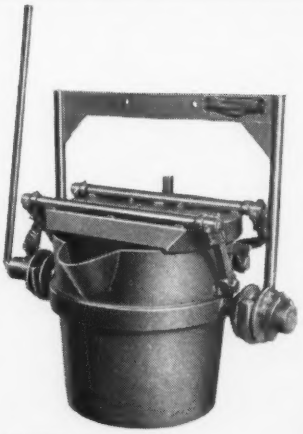
MODERN 2000 lb. Cylindrical Covered Ladle with special bail. Tilted by motor or hand wheel.

CASTINGS
for the
AUTOMOTIVE INDUSTRIES
poured by
MODERN LADLES
all sizes
all types



MODERN 1200 lb. Geared, Single Shell Covered and Insulated Ladle with V-Bail

MODERN 50,000 lb. capacity, 86" top diameter, geared, tapered bottom-pour ladle.



MODERN 17½" Top-Diameter Tapered Covered Ladle with No. 1 Type Shank, Roller Bearing Trunnions and Detachable Bail.

MODERN 400 lb. Covered and Insulated Cylindrical Ladle; No. 1 Type Shank, Roller Bearing Trunnions, and Detachable Bail

MODERN Special 6000 lb. U-shaped, Covered and Insulated, Motor Driven Mixing Ladle. A coupling connects gear to ladle; makes bowl removable for re-lining.

Ask Your MODERN Representative or Write for Latest Ladle Bulletin.

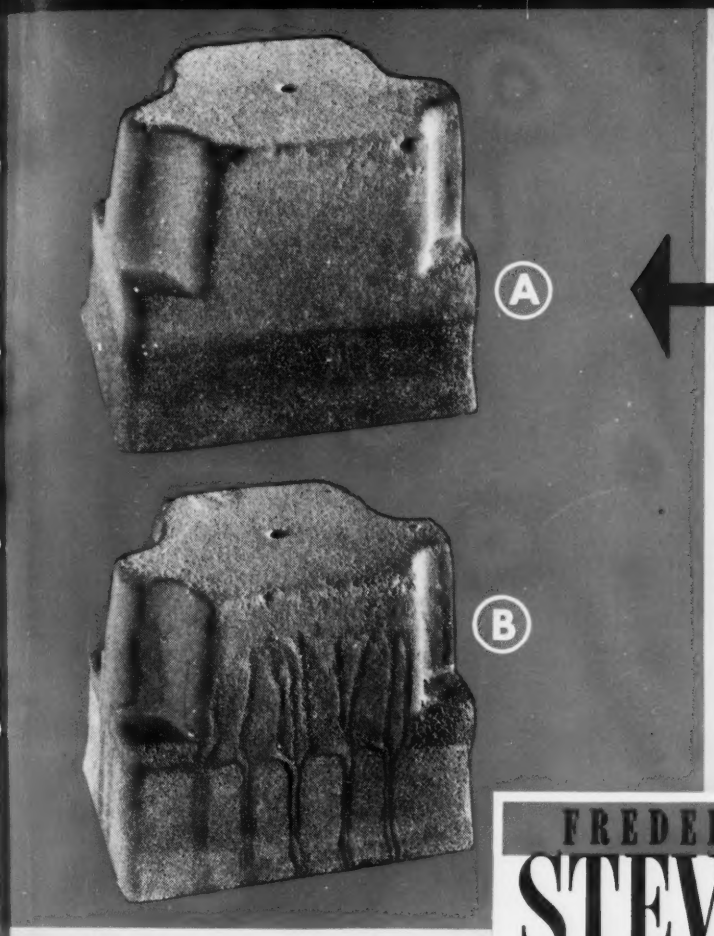
MODERN EQUIPMENT CO.
PORT WASHINGTON, WISCONSIN

CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES.

THEY'RE NEW! THEY'RE DIFFERENT!

2 NEW STEVENS CORE COATINGS

FOR BETTER CASTINGS—AT LOWER COST



STEVENS GRAPH-KOTE

A GRAPHITE CORE COATING

The unretouched illustrations at the left show (A) a core that has been dipped in the new Stevens Graph-Kote Core Coating while (B) shows another core dipped in an ordinary core coating. Observe the difference between these two coatings. Stevens Graph-Kote shows no bleed, no run-down, no tear-drops, no build-up, while the other coating shows all of these defects. The new Stevens Graph-Kote produces better castings at lower cost when used on cores and molds for grey iron, non-ferrous and alloy castings. It produces a true grey iron color on castings.

STEVENS RED-SKIN

A REFRACTORY CORE COATING

Below are shown unretouched photographs of (C) a core dipped in the new Stevens Red-Skin Core Coating and (D) a similar core dipped in a standard type carbon-free core coating. Note the difference between these coatings. Stevens Red-Skin does not run, streak, tear-drop or pile up at the edge of the core. The other coating shows inferior application. The new Stevens Red-Skin reduces costs and aids in the production of better castings when used on molds and cores for steel, grey iron and non-ferrous. It is carbon-free and is highly refractory.

FREDERIC B.
STEVENS
INCORPORATED
EVERYTHING FOR A FOUNDRY
DETROIT 14, MICHIGAN

After months of research, formulation and testing in foundries under varied conditions, the Stevens Laboratories are proud to introduce two new and different core coatings—Stevens Graph-Kote and Stevens Red-Skin. Both have advantages to foundrymen.

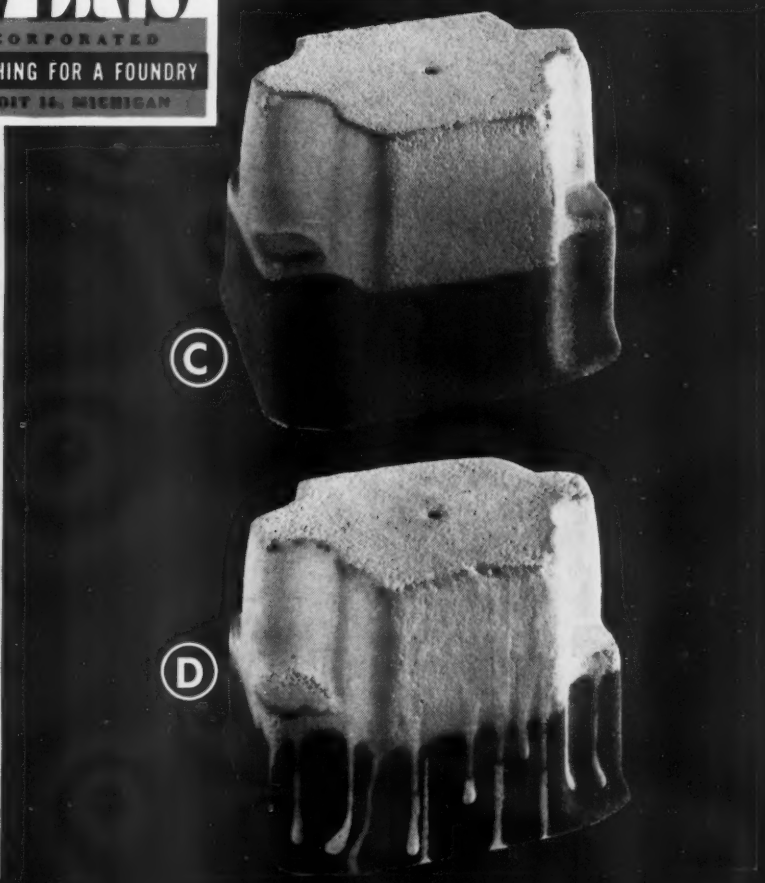
Will Reduce Labor Cost: Since both Graph-Kote and Red-Skin are "short" they coat only where a coating is needed. The dip line is sharp. No run-downs, sags, tear-drops or build-up to clean from cores. Cores can be dipped faster, core prints and assemblies fit accurately and conveyors and oven racks are kept cleaner.

Both Have Deep Penetration: For protection against metal penetration Graph-Kote and Red-Skin seal several layers of sand to insure easy peel from castings. An even, uniform coating gives ample coverage to produce clean castings.

Are Tough and Rugged: Will withstand the most severe conditions of impinging and flowing metal since the coatings are firmly anchored to mold and core surfaces and are resistant to high pouring temperatures.

Other Advantages: Stevens Graph-Kote and Red-Skin form smooth, foam-free solutions. They are ready to use, with no waiting period, as soon as they are completely mixed. Can be stored indefinitely without deteriorating in polyethylene lined containers.

To get better castings at lower cost investigate Stevens Graph-Kote and Red-Skin Core Coatings today.



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